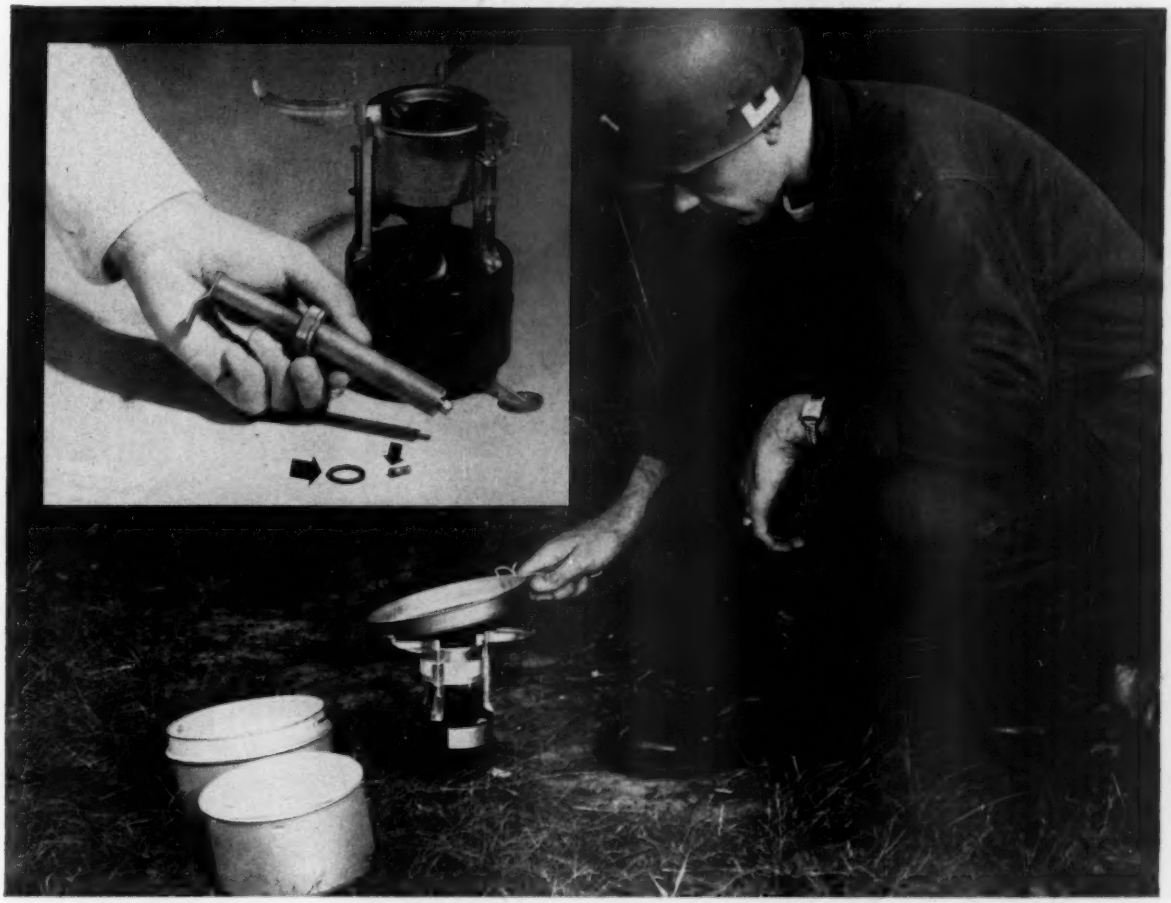
Another new development using

B. F. Goodrich Chemical *raw materials*



Stove manufactured by Rogers Tool & Die Co. Inc., Akron, Ohio. Rubber parts molded by Stalwart Rubber Co., Bedford, Ohio. B. F. Goodrich Chemical Co. supplies the Hycar rubber only.

HYCAR lends a hand in front-line cooking!

THIS ingenious Army portable stove can cook a meal in a jiffy with safety! It can also be carried around in any position without leaking its gasoline fuel.

Hycar helps it do its job—in two important ways. One is in the built-in air pump which forces the gasoline fuel into the burning jet. At the pump-bottom is a check valve which is always immersed in gasoline. The valve seat must resist the fuel's deteriorating effects—and it *does,* because it is made of Hycar nitrile-type rubber. Hycar is extremely resistant to petroleum products—assures retention of original shape because of its good compression set and resistance to cold flow.

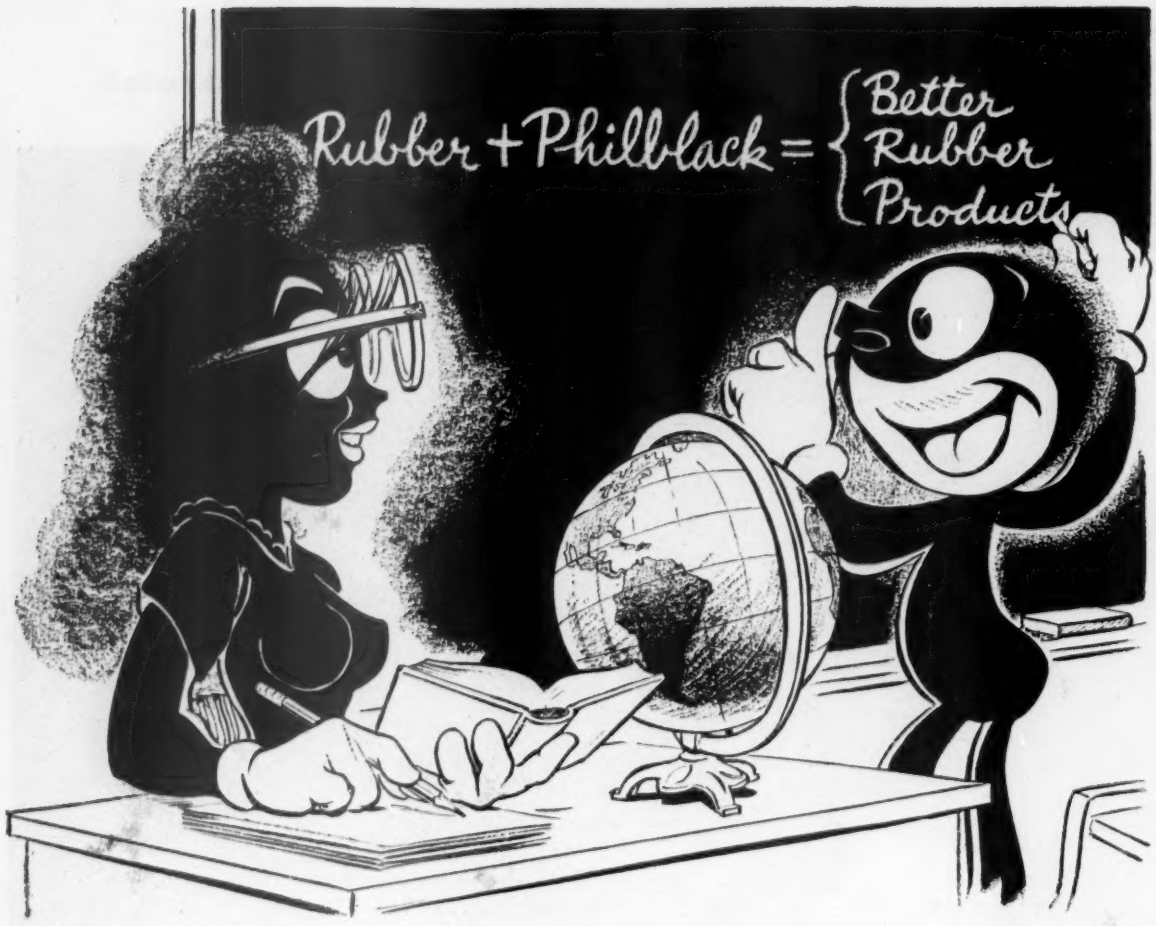
Around the fuel tank filler cap is a Hycar seal, which prevents leakage of the gasoline fuel, no matter how the midget stove is carried. Protection for the serviceman *and* the stove. The Hycar valve seat and gasket meet military specifications MIL-S-107368.

Hycar rubber compounds are used in many applications. For Hycar can be made resistant to heat and cold, water, weather and wear, gas, oil and many chemicals. Perhaps Hycar can help you solve a tough problem, develop or improve more saleable products. For technical bulletins, please write Dept. HB-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
Reg. U.S. Pat. Off.
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors



Whatever your rubber problem may be There's a **Philblack*** *to solve it...* **A, O,** *or* **E!**

The Philblacks come up with the right answers to a lot of difficult questions!

Philblack A can show you how to turn out smooth tubings at high speeds. Easy mixing, too. And this MAF black gives good physical characteristics to finished products.

Philblack O knows how to reduce dangerous static electricity in tires, belts and hoses. This HAF black provides excellent abrasion resistance, good flex life, fine stress-strain qualities.

Philblack E is the right answer when it comes to adding mileage to tire treads. This SAF black provides outstanding abrasion resistance and excellent resistance to cut and crack growth.

For full information, consult our technical sales representative or write our nearest office.

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

EVANS BUILDING · AKRON 8, OHIO

PHILBLACK EXPORT SALES DIVISION · 80 BROADWAY · NEW YORK 8, N. Y.

* A Trademark

Philblack E, Philblack O, and Philblack A are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

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Reinforcing High Styrene Resin

EASY PROCESSING

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Your Perfect Answer for Reinforcing Wire and Cable Insulation and Jacket Compounds

Ideal for improved electrical characteristics; less scorch; faster and smoother extrusions; lower water-absorption; increased toughness, tear and abrasion-resistance; and for less chalking and cracking on weather exposure.

Lower Pound-Volume Cost than Oil Resistant Rubbers!

ORDER NOW! STOCK READILY AVAILABLE!

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GARY, INDIANA

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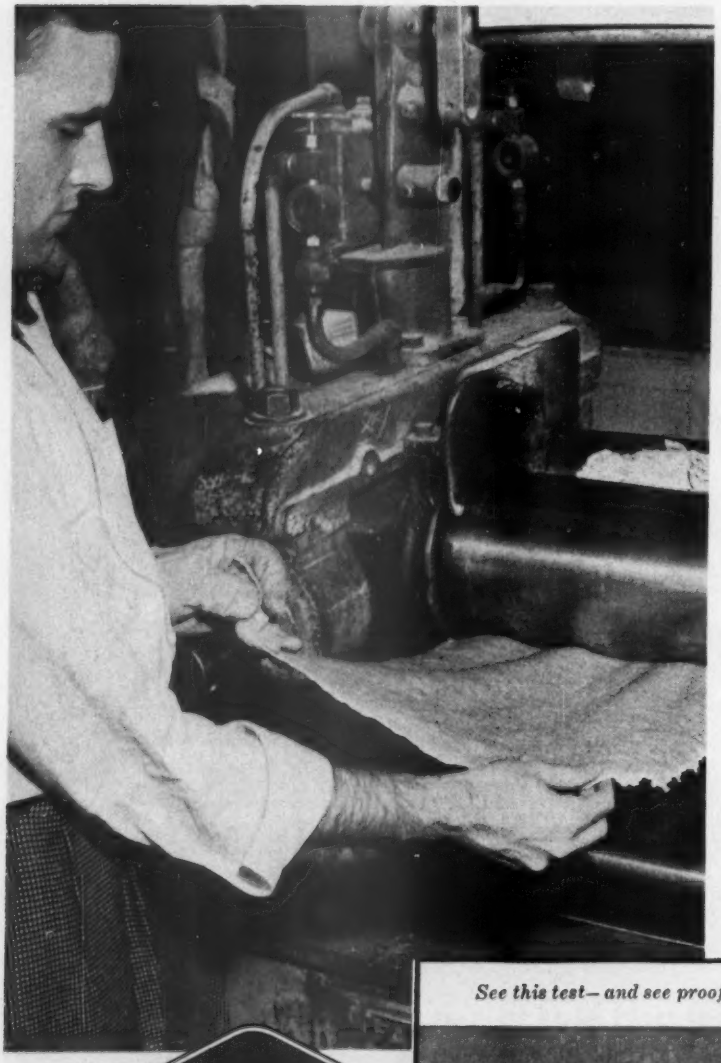
It BLENDS as it STRENGTHENS as it IMPROVES

Here's "before your eyes" Proof—

You Get Finer Dispersions Faster Using PLIOLITE S-6B



Take a close look at the samples shown below! They are easy-to-see proof of the superior processability of PLIOLITE S-6B – the outstanding resin for reinforcing rubber.

These samples are the result of a new test – a fully comparative and fully conclusive test that uses "normal production" resins to prove ease of processing. This is a simple, straightforward test. One in which you can readily see the proof. And, you *can* see the proof–through this unusual "before your eyes" offer!

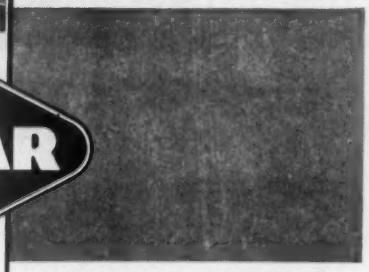
Come to Goodyear – make this your invitation–and see this test. You name the resins to be tested or supply your own samples – including the PLIOLITE S-6B. You watch the entire procedure. You examine the dispersions that result. You prove to yourself that PLIOLITE S-6B gives you finer dispersions faster. All you need do is tell us of your interest.

For full details on how to see and believe the truly easy processability of PLIOLITE S-6B, write to:

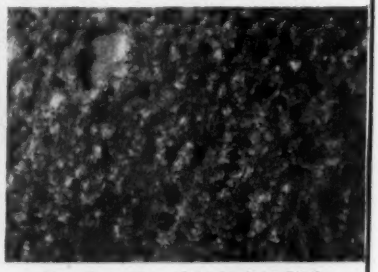
Goodyear, Chemical Division
Akron 16, Ohio

Chemigum, Pliobond, Pliolite, Pliovic–
T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

See this test– and see proof of better dispersions with PLIOLITE S-6B.



Test dispersion of PLIOLITE S-6B in GR-S rubber. Note smooth texture and absence of undispersed resin particles–sure signs of complete blending.

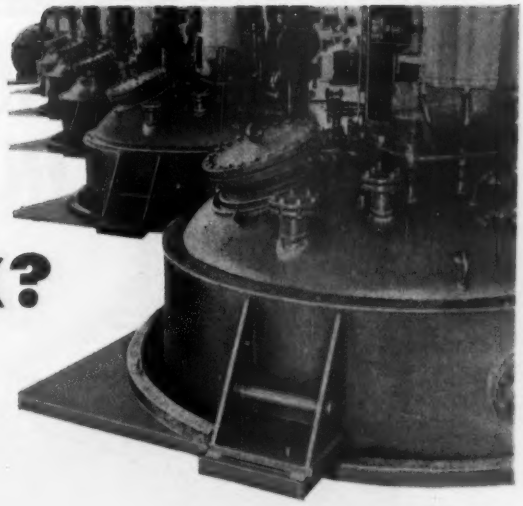


Test dispersion of Resin A in GR-S rubber. Rough surface and undispersed resin particles illustrate incomplete mixing.

CHEMICAL GOODYEAR DIVISION

We think you'll like "THE GREATEST STORY EVER TOLD"– every Sunday–ABC Radio Network–
THE GOODYEAR TELEVISION PLAYHOUSE– every other Sunday–NBC TV Network

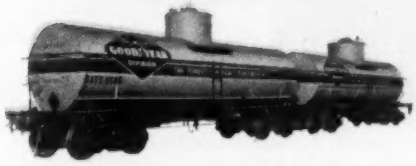
Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIOVIC • WING-CHEMICALS —The Finest Chemicals for Industry



Looking for LATEX?

for coating
for saturating
for bonding

then, look to GOODYEAR



GOODYEAR produces a number of synthetic latices – latices developed through knowing research–latices made to the highest standard of quality and uniformity – latices backed by years of experience in the production of resins and rubbers.

Goodyear manufactures nitrile latices, styrene copolymer latices and vinyl latices. These are available in a range of monomer ratios, solids contents and types of stabilization to give you a wide choice in physical properties and processing characteristics. They also are mutually compatible for even greater versatility and application.

Goodyear latices have many uses in many industries. You'll find them in paints, coatings, finishes, impregnants, saturants, sizings and adhesives in the rubber, plastics, packaging, paint, paper and textile fields.

And, with Goodyear latices you'll find SERVICE –full technical assistance, ample sampling, efficient handling and delivery according to schedule. For synthetic latices as you want them–when you want them–look to Goodyear. For full information, write to:

Goodyear, Chemical Division, Akron 16, Ohio

LOOK AT THESE LATICES

NITRILE TYPE:

Chemigum Latices–"200" Series

Butadiene-acrylonitrile copolymers

Medium to high nitrile content

High solids content

Three types of stabilization

STYRENE COPOLYMER TYPE:

Chemigum Latices–"100" Series

Butadiene-styrene copolymers
Medium styrene content
High solids content

Pliolite Latices–"100" Series

Butadiene-styrene copolymers
High styrene content
Medium solids content

VINYL TYPE:

Pliovic Latices–"300" Series

Vinyl copolymers
High vinyl content
High solids content

CHEMICAL
GOODYEAR
DIVISION

Chemigum, Pliobond, Pliolite, Pliovic–T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

We think you'll like "THE GREATEST STORY EVER TOLD"
every Sunday–ABC Radio Network
THE GOODYEAR TELEVISION PLAYHOUSE
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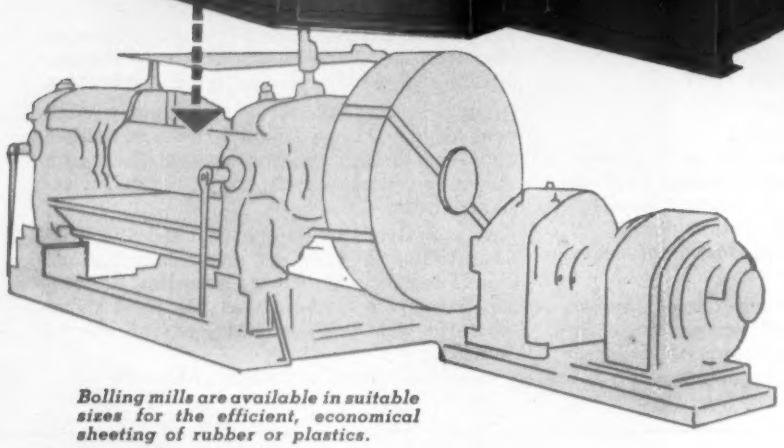
Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry

PUT IT TO WORK WITH THE PROPER MILL . . .

A BOLLING SPIRAL-FLOW INTENSIVE MIXER

THIS "TEAM" CAN DOUBLE, TRIPLE, PERHAPS EVEN QUADRUPLE YOUR PRODUCTION—*AT A LOWER COST.*

No. 4 Bolling Spiral-Flow Intensive Mixer for batch of approximately 150 pounds of 1.5 gravity, with 125 h. p. gear head motor on one-piece base.



Bolling mills are available in suitable sizes for the efficient, economical sheeting of rubber or plastics.

Write today for our new Bulletin "A-4".

Yes, sir, we mean just that! Bolling Spiral-Flow Intensive Mixers have been known to jump production 300% and cut mixing costs 70%. Bolling's 30-year background is ready to show you how you possibly can do likewise. These distinctive Bolling features will help:

1. Spiral-Flow steel sides which turbulate water or steam for hastening maximum heat transfer.

2. Split end frames for rigidity and quick accessibility.

3. Anti-friction bearings maintain true centers, reduce power maintenance and practically eliminate end play in rotors.

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• INTENSIVE MIXERS AND MILLS • CALENDERS • REFINERS • CRACKERS HYDRAULIC PRESSES • PUMP UNITS BALE SLITTERS • SPEED REDUCERS

RUBBER FABRICATORS NEED ACCURATE CUTTING DIES

For Cutting

Rubber, Neoprene, Plastics, etc.
Sheeting, Foam, Sponge, Cellular,
Cured & Uncured

Gang Dies Our Specialty

- Accuracy to close Tolerances
- Durability
- Genuine Understanding of the problems of rubber goods manufacturers

MALLET HANDLE DIES

PURPOSE — For those who have no machinery and do not wish to purchase any. For Cutting — Rubber, Neoprene, Plastics, etc.

ADVANTAGE — Cut direct from bolts or not.

SERVICE—One to three days.

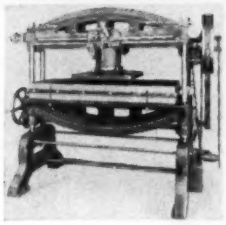
STEEL RULE CUTTING DIES

Used on Die Cutting Press, Printing Press or Power Press

PURPOSE — Especially suited for cutting — Rubber, Neoprene, Plastics, etc.

ADVANTAGE—Low in cost. Suitable for long production runs. It is necessary to cut from rectangular sheets which are fed into the press.

SERVICE—One day service.



STEEL RULE CLICKER DIES

Use On Clicker Machine or Dinker Press

PURPOSE—For Cutting Rubber, Neoprene, Plastics, etc.

ADVANTAGE — More reasonably priced than the all steel dies. Recommended for small and medium quantities where cost of an all steel die is not warranted.

SERVICE—One day service.

ALL STEEL DIES

Use On Clicker Machine or Beam Press or Power Press

PURPOSE—For Cutting—Rubber, Neoprene, Plastics, etc.

ADVANTAGE — Cut direct from rolls without first cutting into sheets.

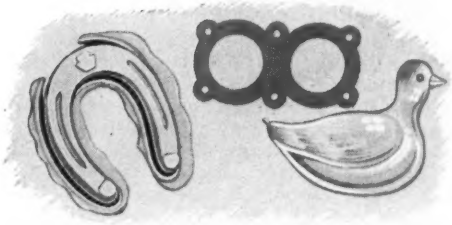
SERVICE—One to three day service on dies.

DIE CUTTING SERVICE

PURPOSE—For those who prefer to have their cutting done by others.

ADVANTAGE—We can die cut your product for you on our own presses rapidly and economically at a low "per thousand" cost.

SERVICE—One to three days.



Dies for cutting
Gaskets, flashing from molded parts, rubber soles, foam and sponge for furniture padding, inflated toys, clothing and footwear, etc.

SAME DAY SERVICE

ACCURATE

STEEL RULE DIE MANUFACTURERS

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Subsidiaries: American Fabricators; Interstate Die Cutting Co., Inc.

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White sidewalls pigmented with Titanox titanium dioxide pigments are the cleanest, brightest white you've ever seen and they stay that way. Titanox pigments can contribute more to white sidewalls than just good looks. Indications are that Titanox "non-chalking" rutile pigments—especially TITANOX-RA-NC—fortify white walls against crazing, chalking and checking... help maintain the even, brilliant original white of new tires.

Physically and chemically stable, Titanox titanium dioxide pigments are compatible with natural and synthetic rubbers, as well as compounding ingredients. Our Technical Service Department is ready at any time to help you choose the best Titanox pigments for your rubber formulations. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

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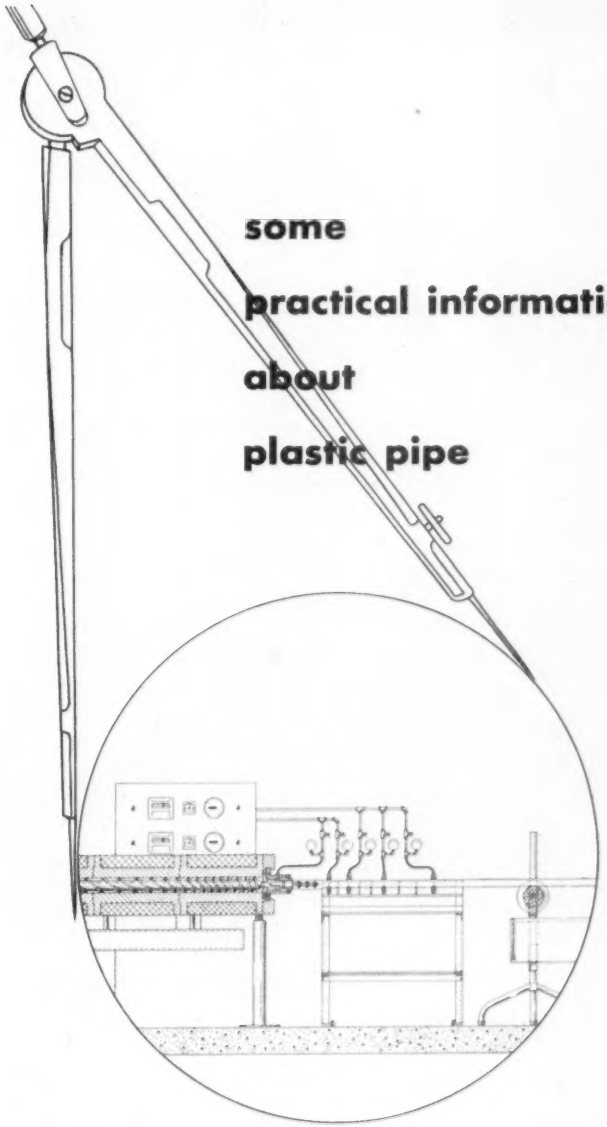


some practical information about plastic pipe

• In a plastic process unit you have these basic elements: extrusion; sizing; stress-relieving; cooling; cutting to length; inspection and packaging. In addition, there is also a reclaiming unit for rejected pipe.

Above you see an illustration of the heart of the plastic pipe processing unit . . . extruder with its die, sizing rings and take-off equipment. Herein lies the success or failure of the finished product.

To make plastic pipe, either rigid or flexible, you start with a choice of basic plastics. Today, there are several accepted basics, such as: modified polystyrene; butyrate; polyethylene and either rigid or semi-rigid polyvinyl chloride. Each of these plastics has specific qualities and individual characteristics. The type you use depends upon the end use to which the finished pipe is to be put.

We have been working with plastics and plastic pipe, and rubber, for many, many years. Our Extruders have produced many miles of plastic pipe. We can give you practical help in setting up either the basic process or the complete plant, designing and building the equipment. Before you undertake your plastic pipe project, consult with the people who know the business.

YOUR INQUIRY — If you want to be in the plastic pipe business, we can help you. A letter of inquiry will receive prompt and confidential attention.

National Erie products for the Plastic and Rubber Industries • Extruders • Simplex Doors for Autoclaves • Mills and Hydraulic Presses.

This old and well-known line of machinery was acquired March 1, 1952, by The Aetna-Standard Engineering Company. They are manufactured in their Warren, Ohio and Ellwood City, Pa., plants. The sales and engineering of the National Erie line is the responsibility of Hale and Kullgren, Inc., Akron, Ohio.

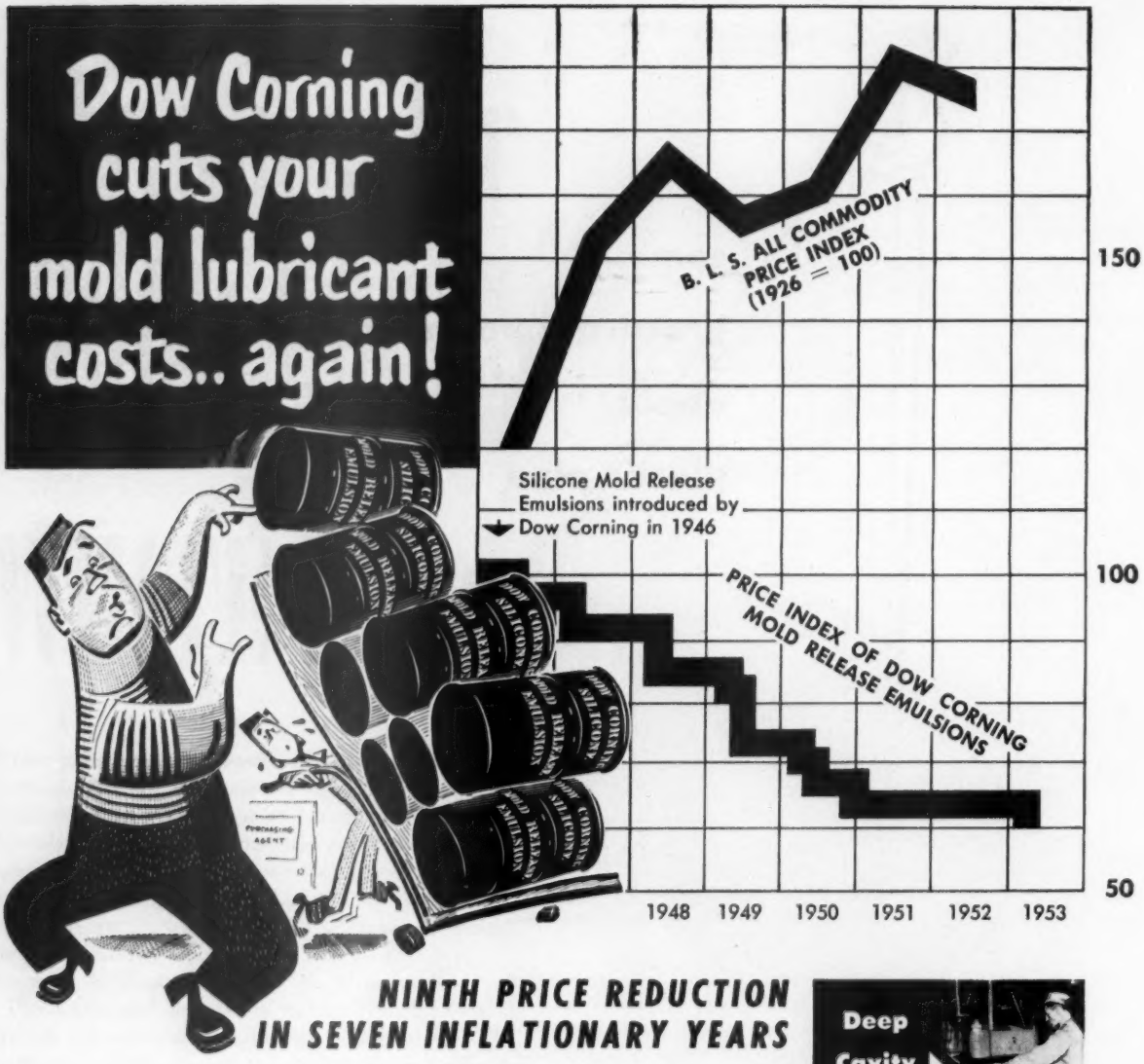
HALE AND KULLGREN INCORPORATED

MANUFACTURING BY

Aetna-Standard

THE AETNA-STANDARD ENGINEERING CO.
PITTSBURGH, PA.

Dow Corning cuts your mold lubricant costs.. again!



NINTH PRICE REDUCTION IN SEVEN INFLATIONARY YEARS

The more Dow Corning Silicone Release Agents you use, the less it costs us to produce these heat-stable mold lubricants. And our savings are passed on to you in the form of lower prices. For example, to meet the steadily growing demand, we have more than tripled our production of silicone release emulsions since 1946. As a result our prices have been steadily reduced until they are now only 60% of the introductory price.

That's pretty conclusive evidence of the important part these materials play in the rubber industry. Seven years of experience in plants all over the world has proven that our silicone mold lubricants reduce scrap to the vanishing point, cut mold maintenance costs as much as 80%; add sales appeal by improving the appearance of finished products.

Tires, mechanical rubber parts, hose and tubing, heels and soles, floor tile, white or heavily loaded stocks unload faster from molds that stay cleaner longer when lubricated with Dow Corning silicone release emulsions. And the cost of the mold lubricant is lower now than ever before!

For more information call our nearest branch office or write direct for Data Sheet CM-4.

Dow Corning Silicones Mean Business!

DOW CORNING CORPORATION

DOW CORNING SILICONES

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THIS Erie Foundry Company 800 Ton Precision Hydraulic Press is designed and built to close tolerances. A number of these special presses purchased by one of the nation's largest rubber processors, are required in precision molding of special rubber products. Your specifications for precision presses are in capable hands when you send them to Erie Foundry Company. A half century of engineering and craftsmanship is at your command. Write for bulletin 350.

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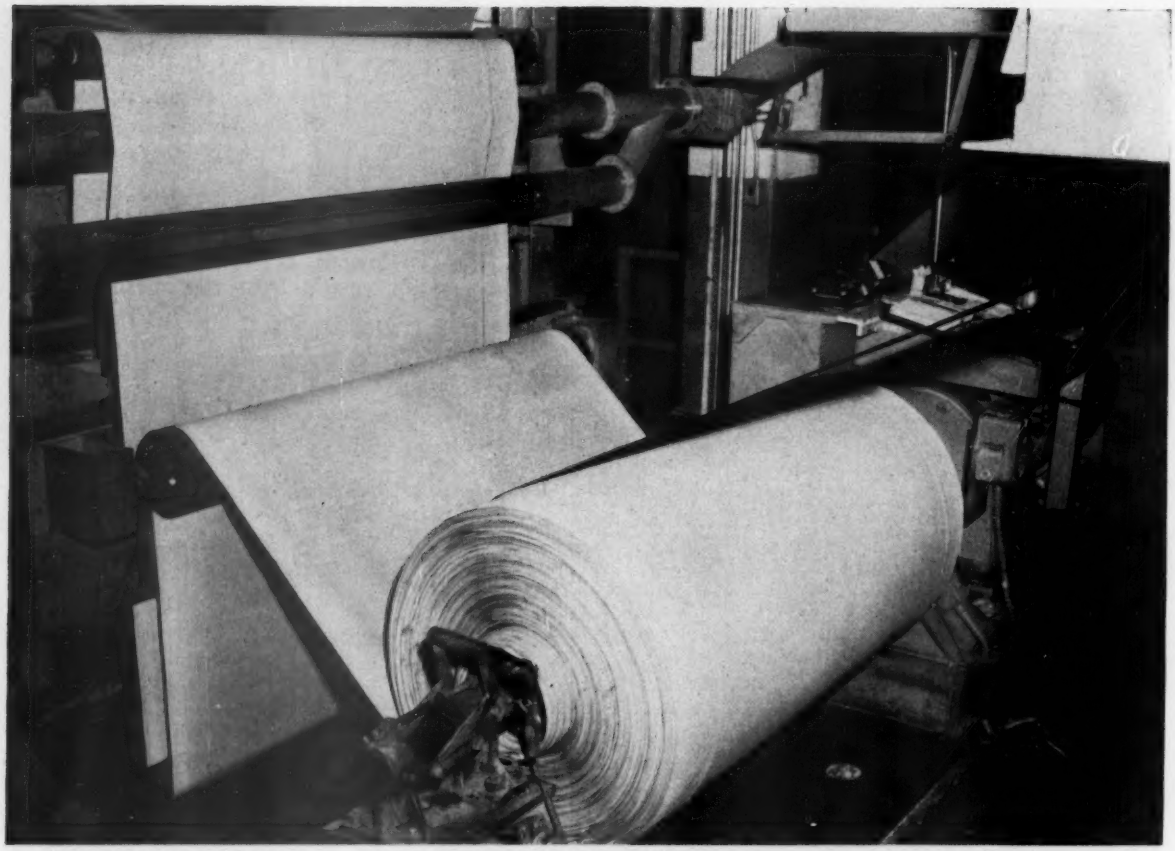

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Pay Off—In Any Width

Regardless of the width of your stock, roll it into a Climco Processed Liner when it leaves the calender. For handling any size stock, Climco Processed Liners pay off in faster, lower cost production.

Climco Processed Liners preserve tackiness, eliminate lint and ravelings. And new minimums are established for stock losses because gauge distortion is permanently eliminated. Climco Processed Liners help keep production going smoothly. Climco Processing—for more than 31 years giving the rubber industry a superior liner—is carefully applied by expert craftsmen using only proved ingredients. As a result, your liners last longer—years longer.

Try Climco Processed Liners in your plant. Find out why more and more companies in the rubber industry are standardizing on Climco.

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Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.

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Treatment Contains
NO OIL OR WAX
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PROCESSED LINERS
FOR FASTER, BETTER PRODUCTION AT LOWER COST

THE CLEVELAND LINER & MFG. CO. CLIMCO CLEVELAND, OHIO, U.S.A.

offers a complete line of high quality, dependably uniform

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and

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PICCO Coal Tar Aromatic Solvents are available in a complete series of grades, from low to high boiling points, each grade being carefully fractionated to closely maintain specifications.

Complete data on all grades, and samples for testing, will be sent upon request. Please specify application.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PENNSYLVANIA
Plants at Clairton, Pa.; West Elizabeth, Pa.; and Chester, Pa.

When ordering GR-S Rubbers specify polymers extended with Sundex-53 and Circosol-2XH

Sundex-53 and Circosol-2XH offer you the assurance of polymer uniformity, plus the advantages of the most favorable physical characteristics of the finished vulcanizates.

Minimum downgrading of the polymers takes place during compounding and long storage of raw polymers when these two Sun products are used as extenders.

SUNDEX-53 is a relatively aromatic process aid. Its plasticizing action provides good processing in Banbury and mill mixing. Sundex-53 is highly compatible with natural rubber, GR-S, reclaims and all combinations of these three.

Oil masterbatch polymers with Sundex-53

New Number	Old Number	
X-740	X-712	25 parts Sundex-53, 50/50 rosin/fatty acid emulsified
X-743	X-713	25 parts Sundex-53, rosin acid emulsified
X-737	X-716	37.5 parts Sundex-53, 50/50 rosin/fatty acid emulsified
X-724		37.5 parts Sundex-53, rosin acid emulsified

CIRCOSOL-2XH is a relatively naphthenic process aid. Its plasticizing action is not quite as great as that of Sundex-53. However, its nonstaining characteristics permit wider application. With small amounts of peptizers, Circosol-2XH provides desirable processing stocks.

Oil masterbatch polymers with Circosol-2XH

New Number	Old Number	
X-738	X-628	25 parts Circosol-2XH, 50/50 rosin/fatty acid emulsified
X-745	X-693	25 parts Circosol-2XH, 50/50 rosin/fatty acid emulsified; nonstaining
X-747	X-717	37.5 parts Circosol-2XH, rosin acid emulsified
	X-718	37.5 parts Circosol-2XH, fatty acid emulsified
X-735	X-722	37.5 parts Circosol-2XH, rosin acid emulsified; nonstaining

Oil black masterbatch polymer with Circosol-2XH

New Number	Old Number	
X-746	X-629	25 parts Circosol-2XH, 50 parts HAF carbon black

For more information write Department RA-4

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

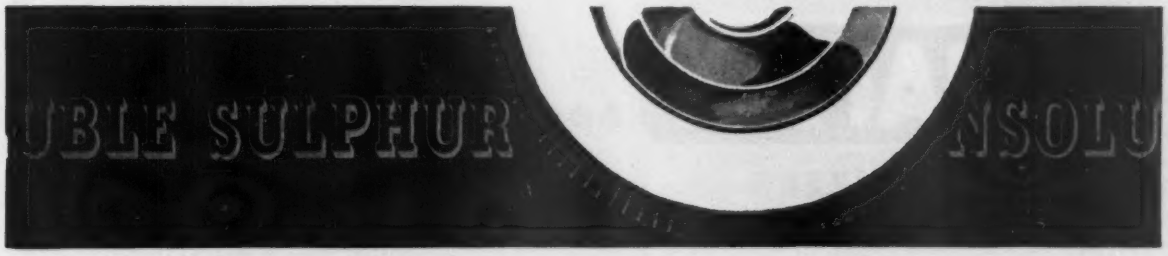
PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

. . . THE DIFFERENCE IS IN THE

INSOLUBLE SULPHUR CONTENT

When you buy CRYSTEX Insoluble Sulphur you can be sure of receiving *at least* 85% insoluble sulphur. For quality products — such as white side wall tires — you can save yourself many production headaches by using *the* quality insoluble sulphur.

CRYSTEX, with its uniformly high insoluble sulphur content, practically eliminates stains and off-color caused by sulphur bloom. CRYSTEX can be used advantageously in tire carcass stocks, white sidewall tires, tube stocks, repair stocks, mechanicals, naphtha cements, latex dispersions, reclaim stocks and bin stocks. Write for a copy of the CRYSTEX Insoluble Sulphur circular.



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Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure
Refined Rubbermakers' Sulphur, Tube Brand
"Conditioned" Rubbermakers' Sulphur
Flowers of Sulphur, (30% Insoluble in CS_2)

CARBON TETRACHLORIDE
CARBON BISULPHIDE
CAUSTIC SODA
SULPHUR CHLORIDES
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'TUF-GRIP' is available in clear or colors inlcuding black and white.
'TUF-GRIP' is thoroughly dependable ...and it's tough!

IT'S WIDELY ADAPTABLE...
Adheres well to cellulose... wood... rubber ...leather... cloth... cork and synthetic rubber surfaces.

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by HADLEY'S
a new, proved line of
SOLVENT TYPE CEMENTS
FOR MACHINE OR BRUSH APPLICATIONS

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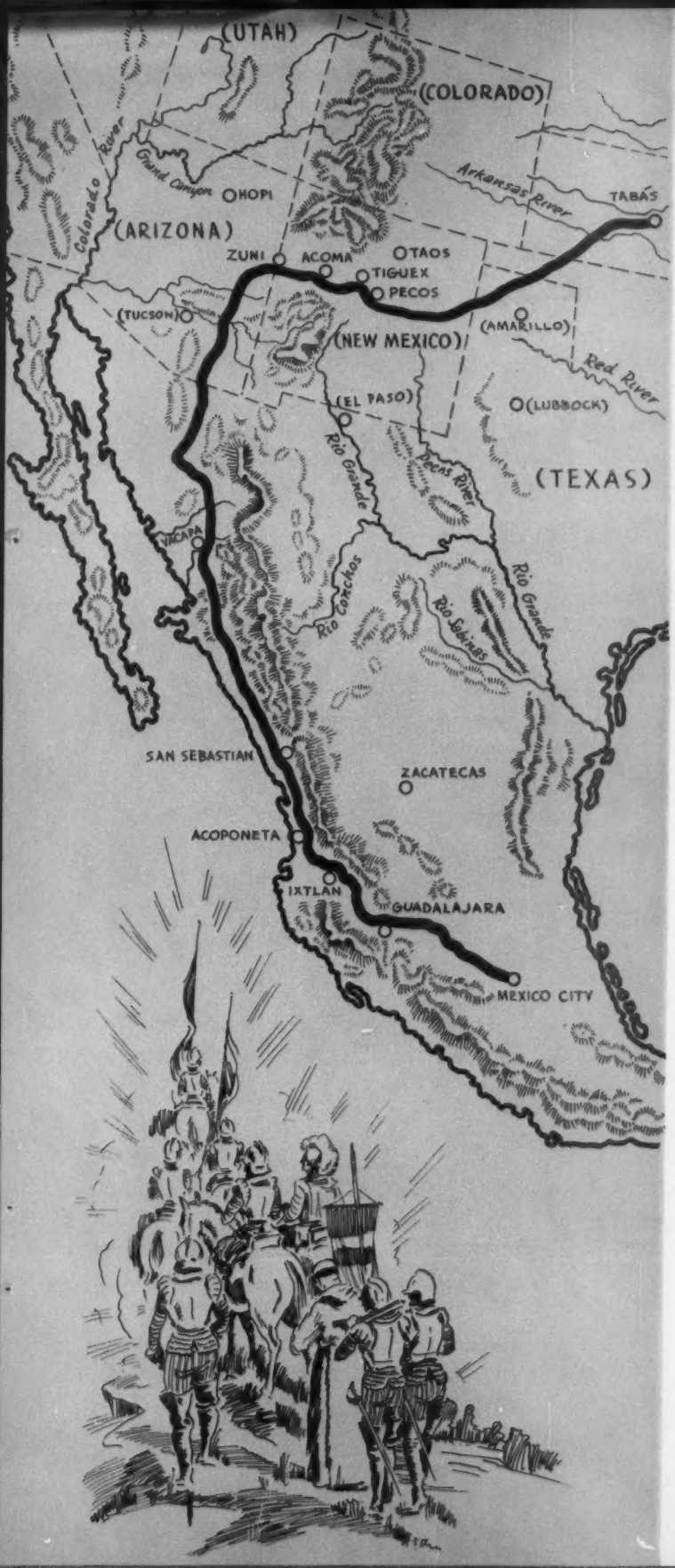
PROPERTIES
Low Specific Gravity — Dark Viscous Liquid
Extremely High Boiling

FOR
Improved Processing — Improved Electrical Characteristics
Minimum Effect on Cure — Better Tear Resistance
Extending Vulcanizates

EXCELLENT COMPATIBILITY WITH
GRS Rubbers—All Types — Buna N Type Rubbers
Neoprene Rubber

AVAILABILITY
Basic Producer — Tank Car or Drums
Warehouse Distribution

PAN AMERICAN CHEMICALS
PAN AMERICAN Chemicals
DIVISION
Pan American Refining Corp.
122 EAST 42ND STREET • NEW YORK 17, N. Y.



The Trail To The Seven Cities of Gold

The story had come down to the settlement at Mexico City that far to the north there existed "Seven Cities of Gold." In 1540, Francisco Vasques de Coronado, 30 years old, with 300 Spaniards and Indian allies, set out to find this fabulous wealth. Turning northwest, they journeyed to the Pacific, ascended along the coast, through the regions now known as Sinaloa and Sonora, exploring Arizona and New Mexico on the way.

The search for the Seven Cities, after the disappointments in the Southwest, took this brave band to the plains of Texas and Oklahoma. Coronado and his men entered Kansas, reaching a point between the Arkansas and Smoky Hill Rivers. These were the first Europeans to see the Zuni and Hopi Indians, the Staked Plains of the Texas country, the Colorado River and Grand Canyon, the abundant buffalo. They opened up a vast region, previously unknown, but the Seven Cities they sought turned out to be the adobe villages of the Indians, without streets of gold.

Vast were the areas traversed by Coronado and his men; mountain ranges were crossed; the heat and dryness of the desert added to the burden of transporting themselves, their food and weapons. Passing through an unknown land, they followed the trails of the Indians — daily facing perils and danger.

Now, where these fearless men once trod, roadways crisscross in endless patterns. The grandeur of Mexico, the glories of the Southwest and the products of their mines, factories and farms are within the reach of millions, who, like the early explorer, still gaze with awe at the wonders nature has created.

From Mexico City, as from other principal cities of the world, are distributed the carbon blacks made by this Company for the rubber, printing ink, paint and other industries. Carbon black has added greater strength and greater safety to the rubber tire, which in turn has been instrumental in linking communities and nations, where once laborious trails were the barriers to travel and communication.

One in a series of famous trails, a reminder of man's progress in transporting himself and his products.

UNITED CARBON COMPANY, INC.

Dixie 60 is High Abrasion Furnace Process (HAF) Carbon Black. Detailed attention is given to its manufacture and rigid quality control is constantly maintained.

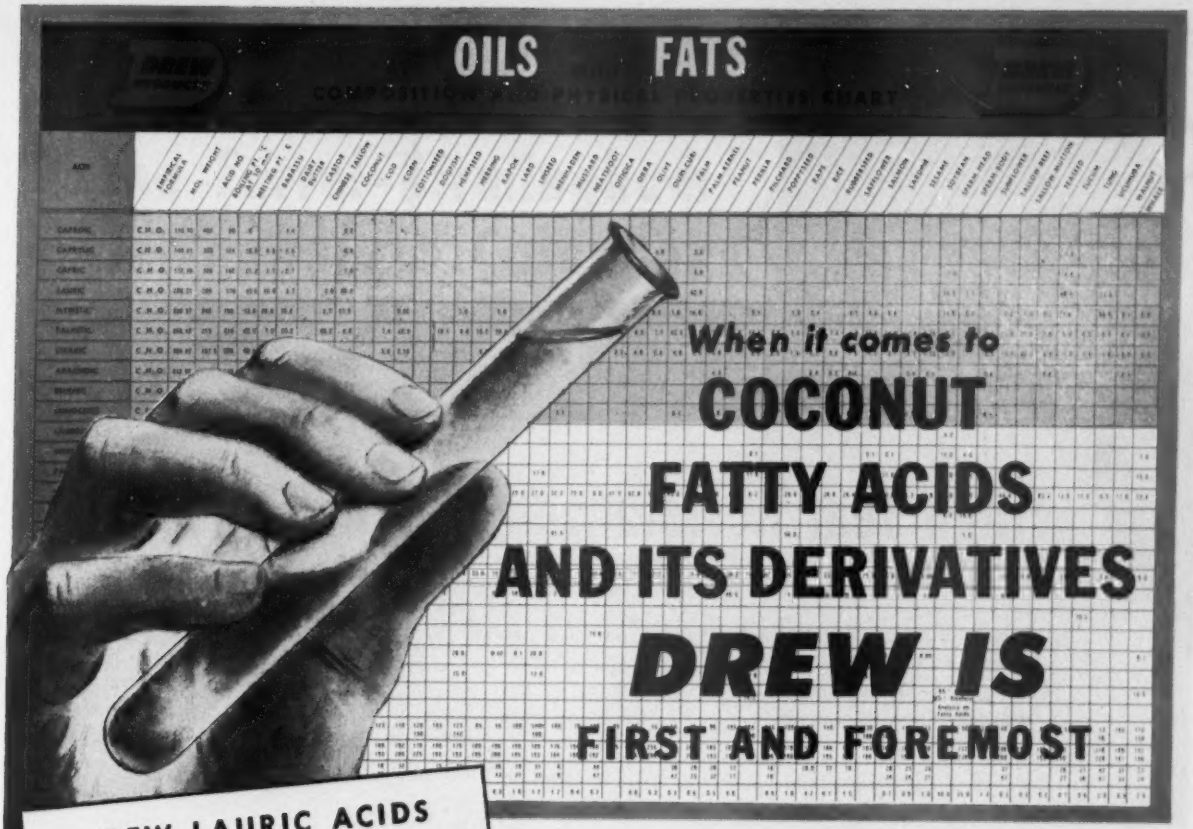
Dixie 60 is highly uniform. It has that extra something which makes for improved processing, high reinforcement and unsurpassed resistance to wear.

Rely on United Blacks to keep your products on top.

UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK AKRON CHICAGO BOSTON
CANADA: CANADIAN INDUSTRIES, LTD.



DREW LAURIC ACIDS

APPROXIMATE CHEMICAL COMPOSITION	AAB %	ABL %	AB %	ABH %	AAAR %
Capric C6	—	—	—	—	—
Caprylic C8	2.0	1.5	1.0	1.0	1.0
Capric C10	4.0	3.5	3.0	3.0	2.0
Lauric C12	90.0	78.0	68.0	68.0	45.0
Myristic C14	2.0	13.0	18.0	18.0	22.0
Palmitic C16	—	8.0	7.0	7.0	11.0
Stearic C18	—	1.0	1.0	0.0	2.5
Oleic C18	2.0	3.0	7.0	3.0	11.0
Linoleic C18	—	—	3.0	—	5.5
Linolenic C18	—	—	—	—	—
APPROXIMATE CHEMICAL DATA	**AAB**	**ABL**	**AB**	**ABH**	**AAAR**
FFA	139-144	138-141	129-132	129-132	116-120
TITRE °C	37.0 Min.	30.0 Min.	24-28	29	30.0 Max.
IODINE VALUE	3.0 Max.	5.0 Max.	8-16	3.0 Max.	14-22
ACID VALUE	277-287	275-281	251-263	251-263	232-253
SAP. VALUE	277-287	275-281	251-263	251-263	232-253
COLOR	15.0/2.0	20.0/3.0	20.0/3.0	15.0/2.0	35.0/5.0

Take LAURIC ACIDS, for instance

. . . notice the

- **WIDE CHOICE**
- **OUTSTANDING QUALITY**

Drew markets a variety of Lauric Acids, individually tailored to specific needs in the chemical, drug and cosmetic fields. Continual development of diversified physical properties makes it possible for you to select exactly the right Lauric Acid for your formula. And Drew's consistent uniform quality gives you a *plus* factor that means a head start for your product.

Write for booklet, "DREW FATTY ACIDS" and copy of Drew's new chart, "OILS AND FATS".

TECHNICAL PRODUCTS DIVISION

E. F. DREW & CO., Inc.

15 East 26th Street, New York 10, N. Y.

CHICAGO PHILADELPHIA BOSTON

DREW PRODUCTS

High Tear Resistance At Low Cost

SUPER MULTIFEX® and MULTIFEX MM®, our ultra-fine particle-size calcium carbonates, will give you soft, flexible, light-colored, top-quality GR-S and natural rubber compounds with maximum tear resistance at very low cost.

Other DIAMOND products such as Kalite®, Millical® and Non-Fer-Al® also produce specialized results. Familiarize yourself with our high-grade, precipitated calcium carbonates and achieve the salable effects enjoyed by so many other manufacturers.

If you haven't heard the DIAMOND story yet, why not call your friendly DIAMOND representative today? Or write us direct in Cleveland for technical literature. If you have a problem, let our Technical Service Laboratory help to solve it for you.

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Houston.

DISTRIBUTORS OF THESE PRODUCTS: C. L. Duncan Co., San Francisco and Los Angeles; Van Waters and Rogers, Inc., Seattle and Portland, U.S.A.; Harrisons & Crosfield (Canada) Ltd.

DIAMOND ALKALI CHEMICALS®

DIAMOND CHEMICALS FOR THE RUBBER INDUSTRY

DIAMOND ALKALI COMPANY • CLEVELAND 14, OHIO

ANNOUNCING
the Farrel-Birmingham Tri-angular* Calender

New design raises level of accuracy and quality for any calendering process requiring two passes

This new, three-roll, *Tri-angular* calender provides closer control of gauge and easier feeding conditions.

The right-angle arrangement of the rolls isolates the separating forces. With only two rolls in any plane, there is no pressure from a third roll to affect roll settings and cause fluctuations in gauge. Hydraulic pullback cylinders hold the rolls in position, eliminating backlash in boxes and adjusting screws.

The angle of the rolls makes feeding easier by providing better support to the feed bank. Both the bank and the guides are easily accessible from floor level.

Although the standard calender has mechanical lubrication, a flood-lubrication system can be specified for high-temperature operation. Other optional features include rolls drilled longitudinally for close temperature control, a motorized crossed-axes device for fine adjustment of roll "crown" on the gauging pass, and the Farrel Uni-drive.

Available in a choice of sizes, the Farrel-Birmingham *Tri-angular* calender is the machine of the future — for any type of production requiring two calendering passes. Write for further information.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N.Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

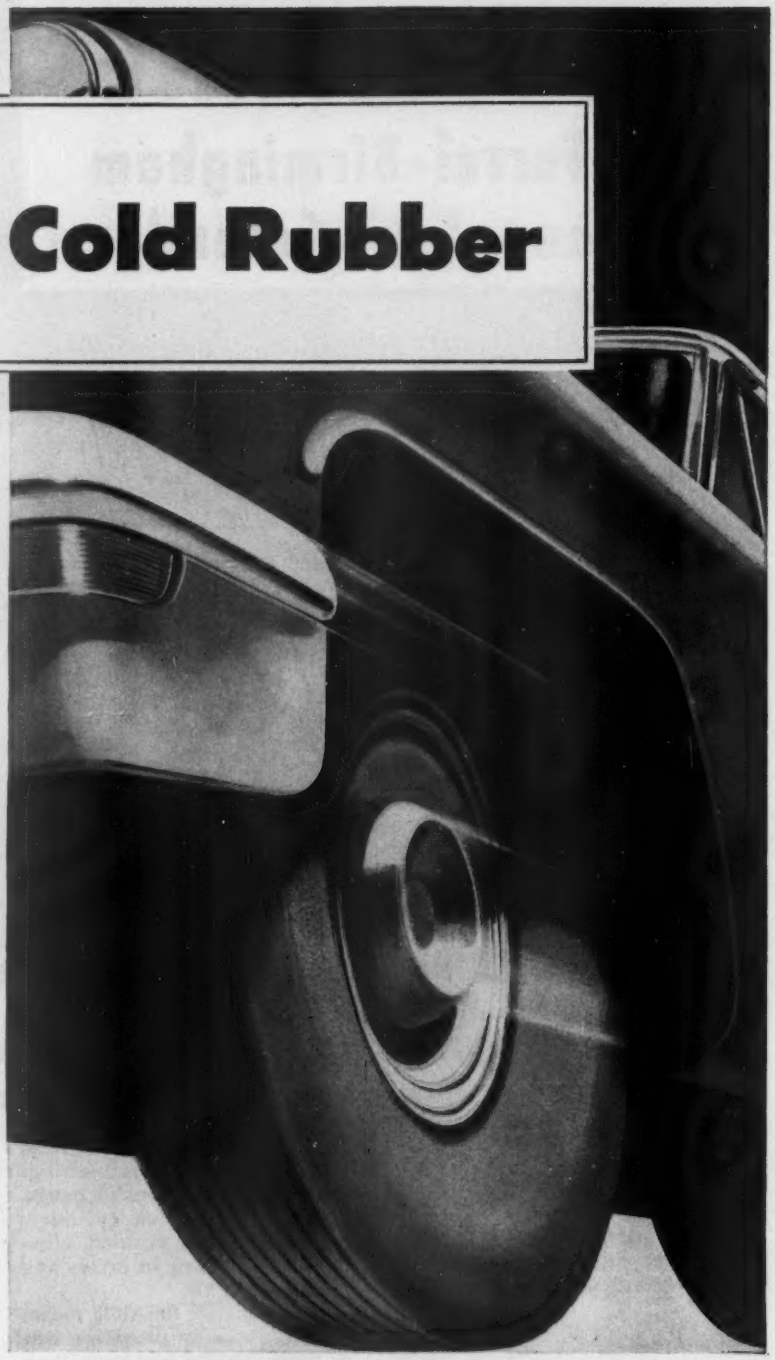
* The *Tri-angular* calender, like the "Z" calender, is an original Farrel-Birmingham development.

Although its angular roll arrangement and some other features are new to three-roll design, they are by no means experimental. All have been used successfully in the Farrel-Birmingham "Z" calender, which has proved to be the outstanding development in calenders in recent years.

Farrel-Birmingham®

FB-805

Shift to Cold Rubber



CHEMICAL PROBLEM . . .

. . . automobile tires that last longer under the heat and abrasion caused by today's higher operating speeds.

SOLUTION . . .

. . ."cold rubber", so called because it is made at 5° C. Cold rubber production requires a special emulsifier to bring together its basic ingredients—butadiene and styrene—under refrigerated conditions. The emulsifier found most satisfactory today, as when GRS-10 was introduced in World War II, is Dresinate®—one of many chemical materials produced by Hercules for the rubber industry.

RESULT . . .

. . . tough, synthetic rubber that can be economically produced in quantity from readily available materials. Now used extensively for the treads of passenger car tires, cold rubber is also proving itself in truck service, for machinery belting, and other places where operating heat and abrasion combine to promote rapid wear.

Many Hercules chemical materials have helped in the development of synthetic rubbers and in improvements of natural rubber products, too. These include hydroperoxides used as polymerization catalysts, hydrogenated rosin, polymerized rosin, Vinsol® resin, reclaiming agents, emulsifiers, casein, and purified cotton linters as a base for tougher tire cords. Hercules welcomes the opportunity of placing its long experience in rubber and associated chemical materials at your disposal.

HERCULES

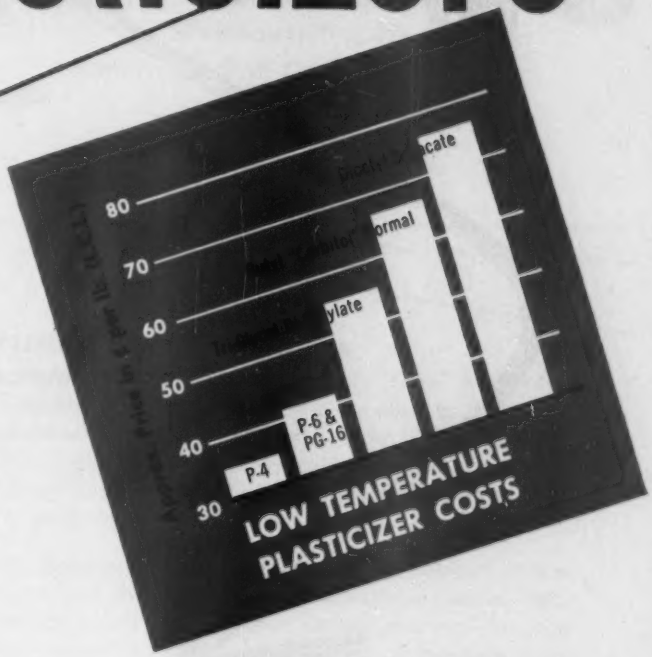
HERCULES POWDER COMPANY 918 Market Street, Wilmington, Del.
Sales Offices in Principal Cities

1952-3

HOW TO CUT COSTS ON LOW TEMPERATURE LOW VOLUME SWELL

SYNTHETIC RUBBER Plasticizers

FLEXRICIN® plasticizers are fully equivalent and, in many cases, superior to the commonly used low temperature plasticizers. Added features are their extremely low volume swell in aromatic fuels and excellent recovery on low temperature compression set. Their cost is much lower. Check this graphic comparison and you will see that costs can be cut substantially.



Flexricin Rubber Plasticizers:

PG-16, Butyl Acetyl Polyricinoleate	25% Nitrile Rubber
FLEXRICIN P-4, Methyl Acetyl Ricinoleate	40% Nitrile Rubber
FLEXRICIN P-6, Butyl Acetyl Ricinoleate	Neoprene GN
FLEXRICIN P-4, Methyl Acetyl Ricinoleate	GRS

ESTABLISHED 1857

THE Baker CASTOR OIL COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

LOS ANGELES • CHICAGO

Mail convenient coupon for 1 quart samples and technical data sheets. Please clip to your letterhead.

Baker Castor Oil Company
120 Broadway, New York 5, N.Y.

Please send samples of the Ricinoleate Esters checked or Technical Bulletin.

☐ PG-16 ☐ P-4 ☐ P-6

☐ Technical Data

Name_____

Firm_____

Address_____

_____

RA-43

what difference does a truck make?

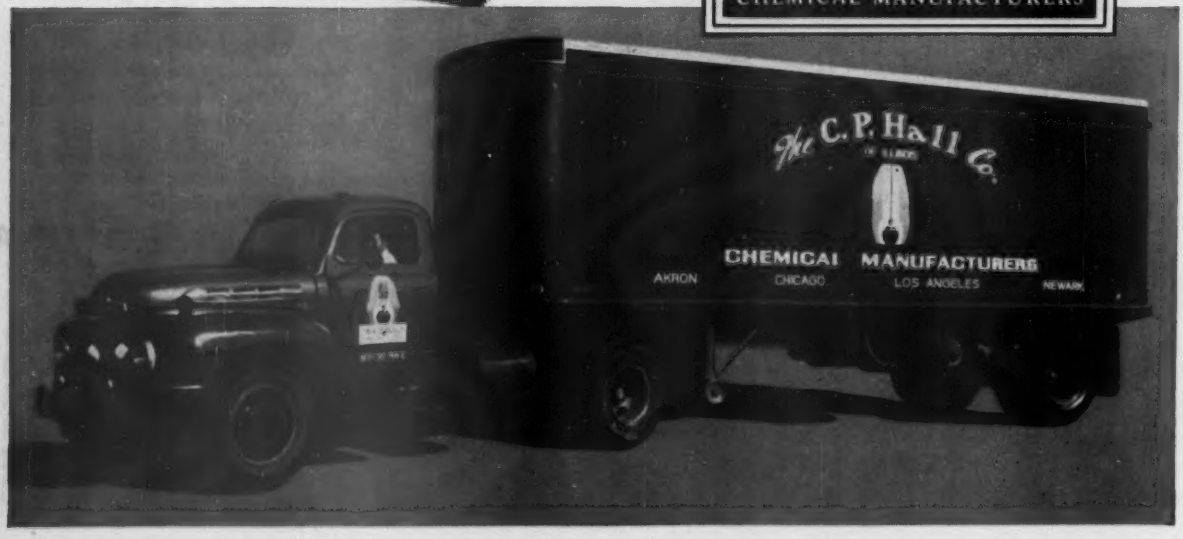
none... if you're talking about quality chemicals! 34 years ago, when our delivery trucks looked like this... The C. P. Hall Company was supplying the rubber industry with QUALITY chemicals.

Today we deliver in trucks like this... and we're still delivering QUALITY chemicals. Remember this, when you think of quality-controlled chemicals: The C. P. Hall Company quality is still the same dependable factor in your production plans!

We have built our business on QUALITY and SERVICE...and have never failed the men in the rubber industry who depend on us for both.

AKRON, OHIO • LOS ANGELES, CALIF.
CHICAGO, ILL. • NEWARK, N. J.

The C. P. Hall Co.
CHEMICAL MANUFACTURERS



REMEMBER THIS TREAD?

It is the tread of The B. F. Goodrich Company's "Silvertown," America's first Cord Tire

Down through the years a long line of great "firsts" has marked the development of the automobile tire like shining milestones. Typical of these were such developments as the first straight-side tire, the first non-skid . . . the first balloon . . . And many of you in the tire industry today will remember the first cord tire, the "Silvertown," introduced in 1910.

These, and *all* the great "firsts" in tires are remembered well at Bridgwater, where making molds for automobile tires has been our business for nearly half a century. In fact, many of the great tire "firsts," have come from molds built by Bridgwater. Since 1906 we have worked closely with the tire industry, helping it manufacture higher quality tires by furnishing higher quality molds sturdily constructed for longer service life.

Our Athens Machine Division, in Athens, Ohio, is the only plant in the world whose entire facilities are devoted *exclusively* to meeting the mold requirements of tire manufacturers. Here, the sole occupation of Bridgwater's experienced engineers and skilled metalworking craftsmen is to produce, in engraved steel, cast iron or aluminum, tire molds of any size or type, at costs which tire manufacturers know are decidedly favorable.

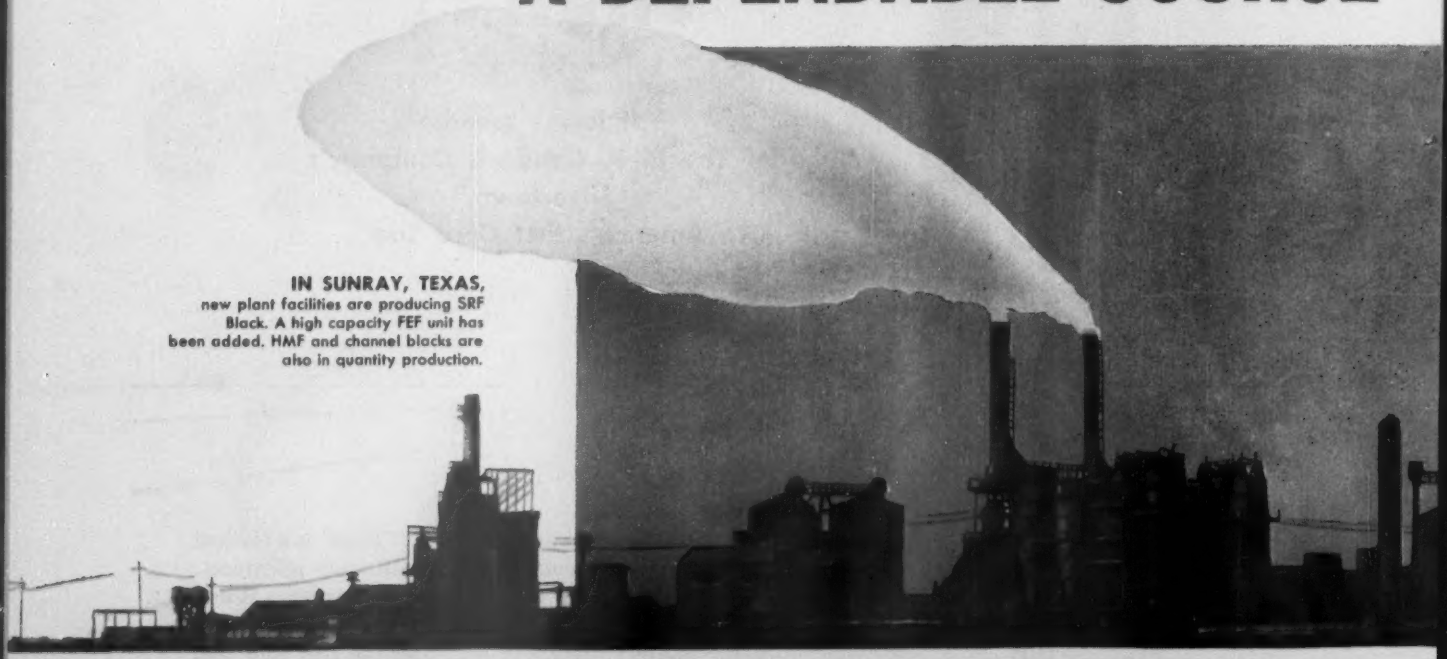
ATHENS MACHINE DIVISION

THE BRIDGWATER MACHINE COMPANY

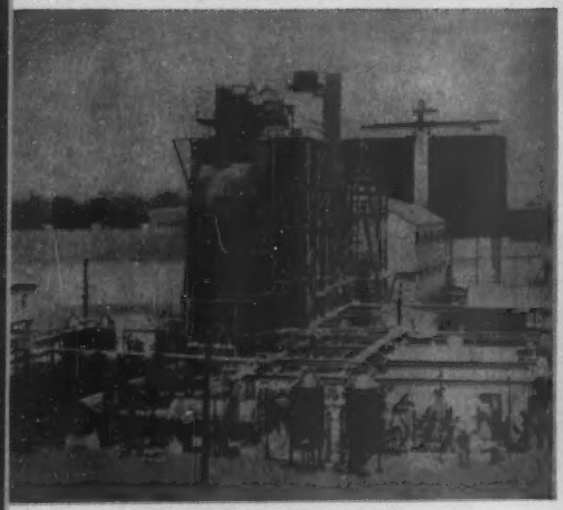
Akron, Ohio

Witco-Continental

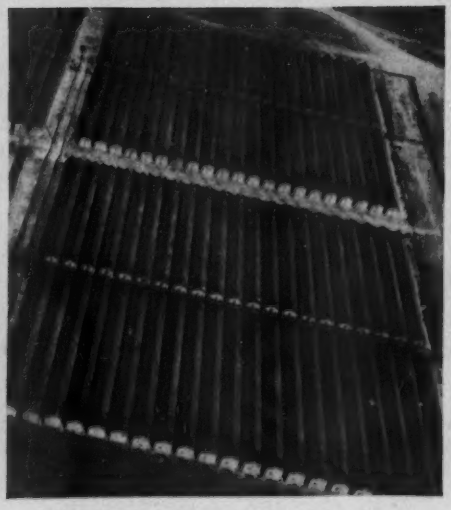
A DEPENDABLE SOURCE



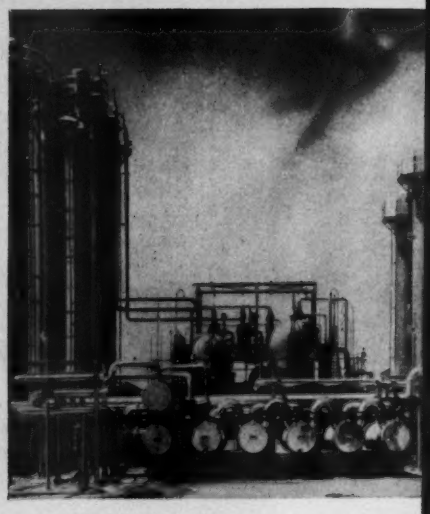
IN SUNRAY, TEXAS, new plant facilities are producing SRF Black. A high capacity FEF unit has been added. HMF and channel blacks are also in quantity production.



IN WESTLAKE, LA., Witco-Continental's new plant has expanded its production of HAF Black.



IN EUNICE, N. M., hundreds of acres of channel black burner houses produce a complete range of channel blacks.



AT BIG LAKE, TEXAS, Witco's natural gas plant produces channel blacks from residual gas.

WITCO CHEMICAL COMPANY

CONTINENTAL CARBON COMPANY

260 MADISON AVENUE, NEW YORK 16, N. Y.

AKRON • AMARILLO • LOS ANGELES • BOSTON • CHICAGO • HOUSTON
CLEVELAND • SAN FRANCISCO • LONDON AND MANCHESTER, ENGLAND

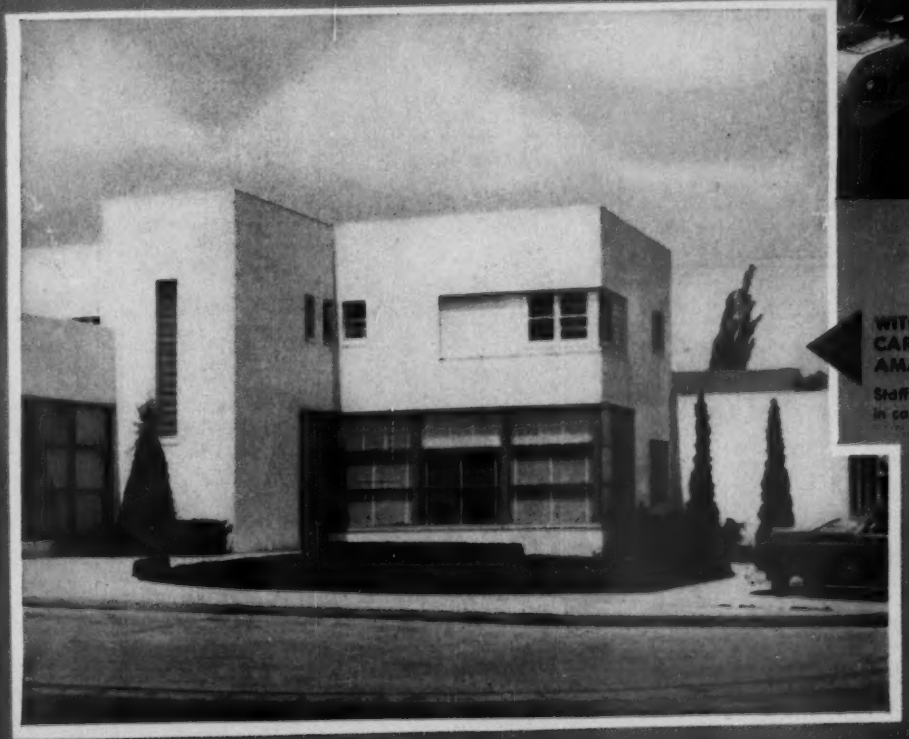
OF SUPPLY

backed by the most modern research and technical service facilities . . .

Sectional view of mill room showing compounding of rubber test batches.

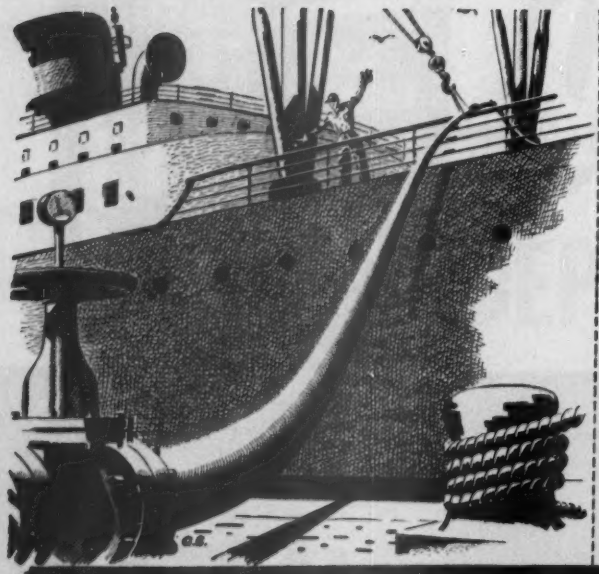
Scott Testers for evaluation of rubber compounds; center machine for elevated temperature tests.

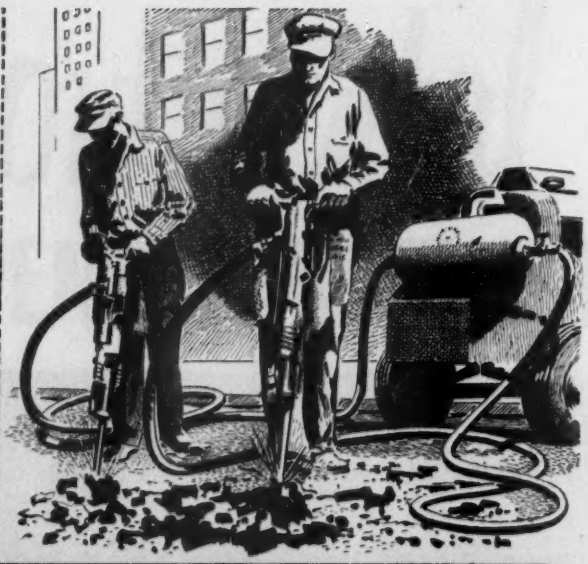
Sectional view of laboratory mill room showing rubber mills, open steam vulcanizer, curing presses.



WITCO-CONTINENTAL CARBON BLACK LABORATORY, AMARILLO, TEXAS.

Staffed by experts, whose long experience in carbon blacks is at your service.





If it's got to lead a **FLEXIBLE LIFE...**

make it "SHAWMUT HOSE DUCK"

another Wellington Sears fabric for the rubber industry

A flexible life . . . and a long and satisfactory one! That's the basic result story of Shawmut Hose Duck, proven in a wide variety of rubber-and-fabric applications.

Especially suited for rubberized hoses for liquids and compressed air, this duck is a soft, open, plied-yarn cotton fabric affording flexibility and good impregnation. It is available in many standard, as well as non-standard, constructions to meet specific requirements.

Shawmut Hose Duck is but one of the many famous Wellington Sears cotton ducks for hoses, belting and other mechanical rubber products. Available from this "headquarters for industrial fabrics," for example, are Dredge Sleeve Duck for large suction hoses and Superior Army Duck widely used as a cover fabric for V-belts.

Based on its 100-year experience in heavy duty fabrics, Wellington Sears also offers fabrics incorporating the unique properties of nylon, high tenacity rayon and other fibers for steam hoses, bulk loading of chemicals and grains and other uses.

Whatever your rubber-and-fabric problem—see Wellington Sears first.

An illustrated 24-page booklet filled with valuable facts on fabric development and applications of interest to present and potential users of industrial fabrics is yours for the asking. Write for a free copy of "Modern Textiles for Industry" to Wellington Sears Co., Dept. L-2, 65 Worth Street, New York 13.

Superior Fabrics for the Rubber Industry

- Belting duck
- Hose duck
- Enameling duck
- Army duck
- Single and plied-yarn chafers
- Sheeting
- Airplane cloth
- Balloon cloth
- Nylon, high-tenacity rayon, other synthetics and combinations.

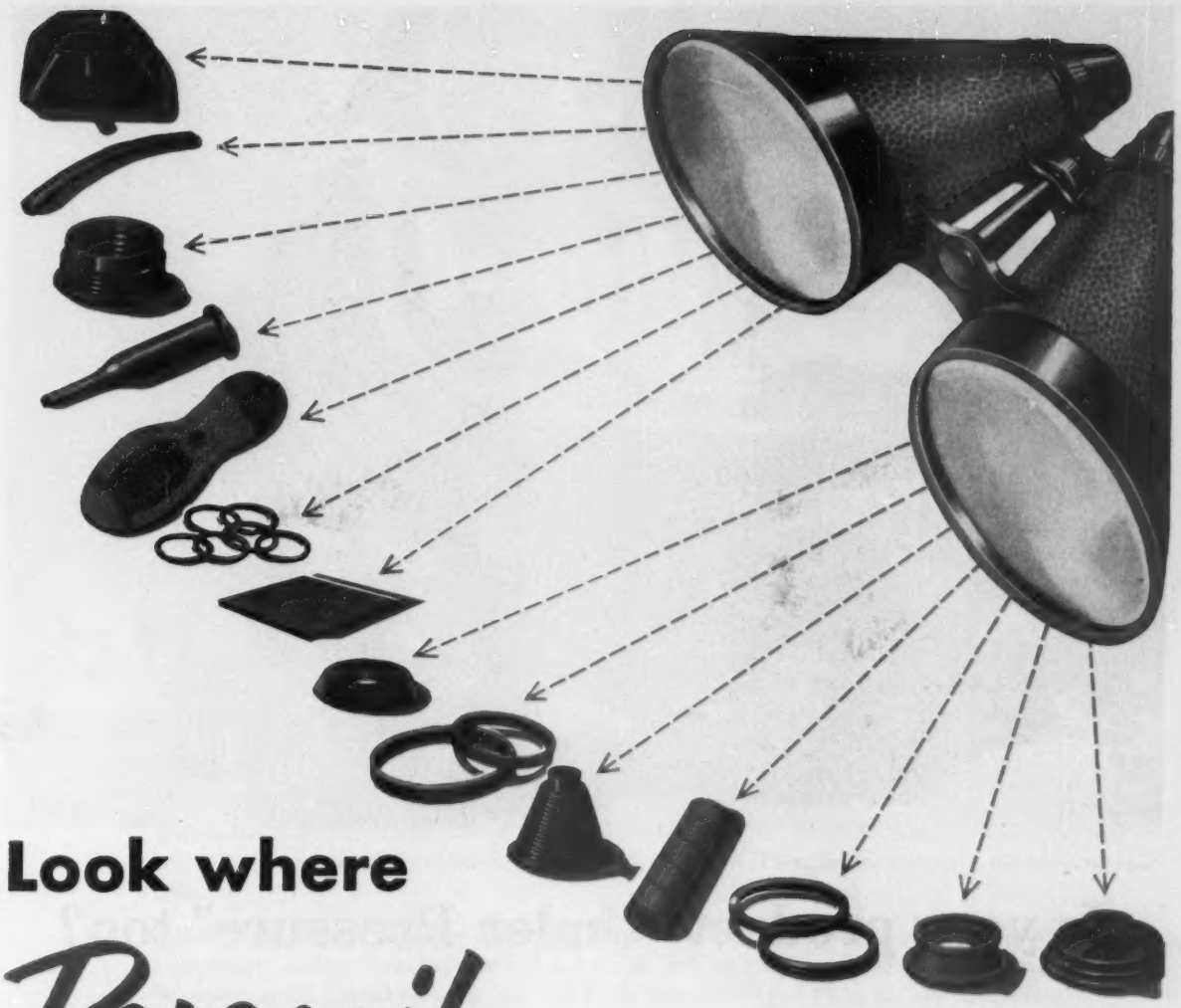
Wellington Sears

A SUBSIDIARY OF WEST POINT MANUFACTURING COMPANY

FIRST In Fabrics For Industry

WELLINGTON SEARS COMPANY, 65 WORTH STREET, NEW YORK 13, N. Y.

OFFICES IN: ATLANTA · BOSTON · CHICAGO · DETROIT · LOS ANGELES · NEW ORLEANS · PHILADELPHIA · SAN FRANCISCO · ST. LOUIS



Look where Paracril pays off!

And chances are you'll see how this unusual nitrile type rubber can pay off for you — in product performance and durability.

Paracril® has demonstrated its advantages in a wide variety of rubber products, including high-pressure grease hose — fuel and oil conducting hose — printing rolls and blankets—cements—Signal Corps field carrier cable—pressure flex hose for service at minus 65°F.—coffee maker seal rings—oil field pump valve inserts—aircraft boots and seals—"O" rings—cord shoe soles—and in hundreds of similar applications.

Wherever you need outstanding oil, fuel, and chemical resistance, low-temperature flexibility, toughness and abrasion resistance, resilience, heat resistance, or any combination of these properties, you'll find Paracril just what your product ordered.

Available in three general grades of oil resistance—moderate, good, and excellent —easy-processing Paracril can be extruded, calendered, or molded by standard rubber techniques. It may be blended with other rubbers or with plastic resins to impart special properties — can be used to advantage **wherever** a rubber-like material is needed.

If you're not fully aware of the many advantages Paracril offers **you**, you'll want to obtain samples for evaluation immediately. Send the coupon below.

Naugatuck Chemical

Division of United States Rubber Company
NAUGATUCK, CONNECTICUT

IN CANADA: NAUGATUCK CHEMICALS DIVISION, Dominion Rubber Company, Limited, Elmira, Ontario
Rubber Chemicals • Aromatics • Synthetic Rubber • Plastics • Agricultural Chemicals
Reclaimed Rubber • Latices

Naugatuck Chemical, 104 Elm Street, Naugatuck, Conn.
Please send ☐ samples, ☐ free booklet, *Paracril Characteristics and Compounding*, to:

Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

Is your product "Under Pressure" too?

Skellysolve for Rubber and Related Industries

Applications

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound. Closed cup flash point about —20°F.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13°F.

SKELLYSOLVE-D. For cements and variety of manufacturing operations. Good odor. Quick drying. Minimum of heavy, greasy compounds. Closed cup flash point about 3°F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-D is desired. Closed cup flash point about —20°F.

SKELLYSOLVE-V. For use wherever a relatively slow drying solvent is desired. Closed cup flash point about 50°F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about —25°F.

"Doc" MacGEE says: Whatever the nature of your product, it's sure to be "under pressure"—under the pressure of competitive products that are forever bidding for the favor of the customer. Strict quality control is the obvious method of keeping your customers sold on your product . . . and this is where Skellysolve forms an important part of your manufacturing picture.

You can bank on Skellysolve for the uniformity that helps to protect your product's high quality. Every batch has the same overall properties you need to keep your plant's production line flowing smoothly. Such dependability results from strict laboratory controls during every step of the Skellysolve manufacturing process. Skellysolve is not a "sideline" but a major product operation of a major oil company.

Run your own tests on Skellysolve and decide! Check its low end point, rapid evaporation, low vapor pressure, minimum of unsaturates and pyrogenic decomposition products. See what Skellysolve's minimum of low and high boiling compounds means in reduced rejects due to blushing and blisters. See how controlled vapor pressure guards against bloated containers. Note the minimum of low boiling compounds that eliminates "seeds" from rubber cements . . . and the minimum of high boiling compounds that gives high bonding strength free from greasy residues.

Special help wanted? Solvent application problems are the specialty of the Skellysolve Technical Fieldman. Send for him, he's always at your service. Or write for more complete technical facts.

SKELLY

Skellysolve

SOLVENTS DIVISION, SKELLY OIL COMPANY
KANSAS CITY, MISSOURI

AIRKEM SPECIFICATIONS

#115 (oil base) for Sponge

#150 for Sponge where unicell n.d. is blowing agent

#122 (water base) for Foam

#186 for Vinyl Film where d.o.p. is plasticiser

to reduce undesirable odors in GR-S products

Application Information

COMPATABILITY: Will combine readily with raw mixes.

AGING: Airkem Specifications have no deleterious effect on aging properties.

TENSILE STRENGTH and RESILIENCY: Product shelf checks of more than a year's duration show that Airkem specifications in no way affect tensile strength and resiliency.

PHYSICAL PROPERTIES: Rubber products treated with Airkem Specifications are unaffected in color, foaming, setting time and density.

ODOR COUNTERACTANTS FOR THE RUBBER FIELD

Case History #12

PROBLEM: A leading producer of foam rubber mattresses and pillows was receiving complaints from dealers and consumers about offensive odors emanating from his products. Some of these odors were of low key types hardly discernible except when the user retired. Then, in direct contact, the odors became offensive.

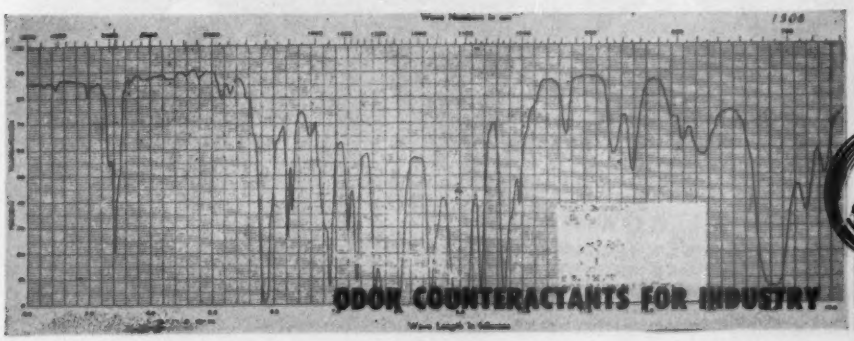
SOLUTION: Airkem engineers discovered that the odor problem was caused by a combination of contributing factors, including the GR-S latex as well as certain polysulphide accelerators. Airkem Specification 115 was added to the raw mix to the amount of ½ of 1% of the dry latex solids.

RESULT: A marked reduction in odor problems and the elimination of this source of consumer complaint. The manufacturer was able to continue with the use of GR-S Latex and other materials which contributed to high manufacturing efficiency and economy. The cost of the Airkem application is measured in pennies per mattress.

These formulations have obtained excellent results in freeing products of odor problems created by decomposed protein in slab or latex, chemical nitrogenous blowing agents, plasticisers, accelerators and stabilizers.

Do you have a problem of this nature? Airkem may be able to provide a practical, low-cost solution.

For information, please write to: **Industrial Applications Dept., Airkem, Inc., 241 E. 44th St., New York 17, N. Y.**



airkem

Inquire about Oronite

POLYBUTENES

—economical plasticizers and rubber extenders

Oronite Polybutenes are an economical rubber extender in the manufacture of a wide variety of molded or extruded rubber products. Their light color makes them specially adaptable to molded rubber products of white or pastel colors.

In addition to extending, Polybutenes plasticize the mass of rubber making it more pliable for easy milling. They also assist in milling reclaimed rubber batches while acting as an extender, and have a field of usefulness in plasticizing various synthetic rubbers.

Product characteristics

Oronite Polybutenes are clear, light colored, chemically stable liquids of moderate to high viscosity and tackiness. They have excellent aging characteristics—do not become gummy or waxy, do not harden, darken or change in any essential property over long periods of atmospheric exposure. They can be readily emulsified using standard techniques and equipment. In the emulsified form, or in their natural form, they are useful as tackifiers, plasticizers or extenders for natural or synthetic rubber latices. Complete information is available in a technical bulletin.

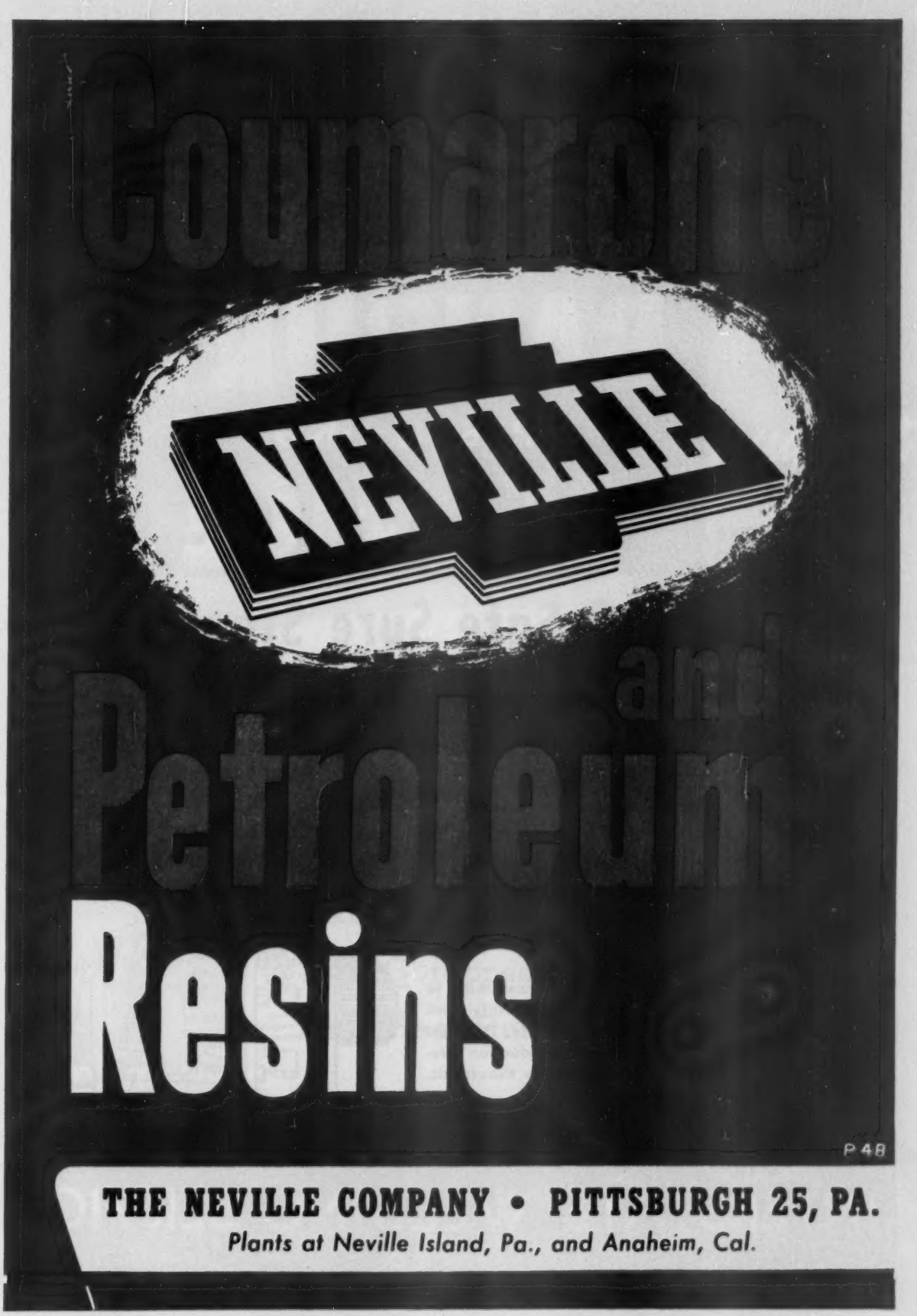
Write or phone the Oronite office nearest you and talk over your problem with us.

ORONITE CHEMICAL COMPANY

38 SANSOME STREET, SAN FRANCISCO 4, CALIFORNIA
30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK
STANDARD OIL BLDG., LOS ANGELES 15, CALIFORNIA
600 S. MICHIGAN AVENUE, CHICAGO 5, ILLINOIS
MERCANTILE SECURITIES BUILDING, DALLAS 1, TEXAS

ORONITE CHEMICAL COMPANY
THE NAME TO WATCH IN CHEMICALS

3691


Coumarone
NEVILLE
and
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THE NEVILLE COMPANY • PITTSBURGH 25, PA.
Plants at Neville Island, Pa., and Anaheim, Cal.

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SAVE VITAL PRODUCTION TIME WITH

Specialized

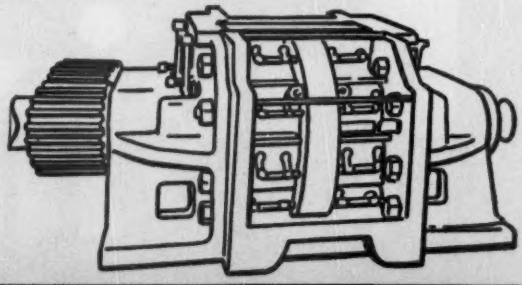
BANBURY REBUILDING SERVICE

9 Safe Sure Steps . .

That Guarantee Your Mixer Body Will Be Restored To Full Efficiency

INTERSTATE REBUILDING SERVICE offers you two options: You can use our "PRE-PLAN" method to have your present body rebuilt and returned to you—or you can INTERCHANGE your old mixer body for one of ours, already completely rebuilt. Either way YOU SAVE valuable weeks of production time. Our facilities handle every size of Banbury, and we can fabricate any of the parts for any type.

It costs you nothing to have the details—and an estimate. It might mean production savings in the thousands.



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EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

INTERSTATE WELDING SERVICE

Main Offices — Metropolitan Bldg., AKRON 8, OHIO — Phone JE-7970

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FOR THE RUBBER INDUSTRY

ETHYLAC

Gaining wide acceptance throughout the rubber industry . . .

This delayed action accelerator can be used to compound stocks with these characteristics:

1. Safe Processing
2. Excellent Mold Flow
3. Low Compression Set
4. Low Heat Build-Up

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Shawinigan Chemicals, Ltd. • Montreal • Toronto
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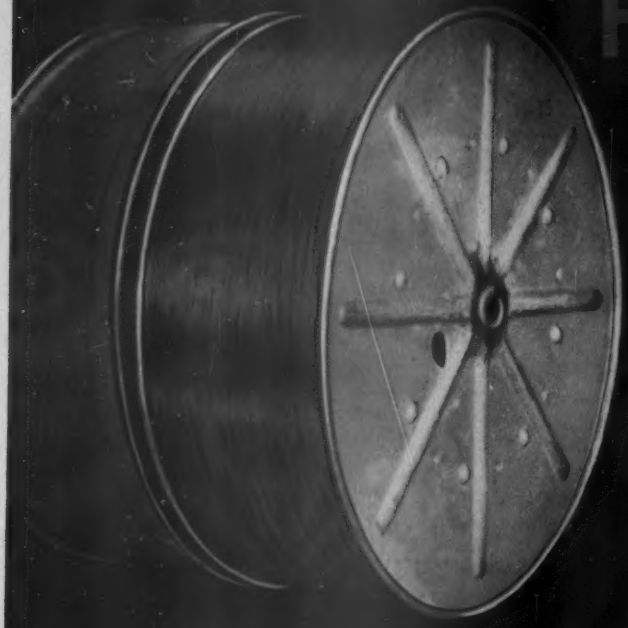

Hose REINFORCEMENT WIRE

JOHNSON special bronze plated wire, for many years the preference of major tire manufacturers — now available for vacuum and defroster hose producers, in addition to conventional liquor finish wire.

• Uniformly clean finish • Maximum adhesion to rubber • Higher elongation • Extra fatigue properties

Johnson line of specialty wires also includes oil-tempered and coldrawn brush wire—tire bead wire—steel wire for field telephones —music spring wire.

If it's steel wire— JOHNSON specialists make it better

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STEEL AND WIRE COMPANY, INC.
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THE STAMFORD RUBBER SUPPLY CO.
"Vulcanized Oil"

THE SEAL OF DEPENDABILITY

Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also to our aqueous dispersions and hydrocarbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

The services of our laboratory are at your disposal in solving your compounding problems.

Oldest and Largest Manufacturers of "Factice" Brand Vulcanized Oil Since 1900

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THE STAMFORD RUBBER SUPPLY COMPANY
Stamford, Conn.

for Conductivity

Vulcan C

A CABOT CARBON BLACK

+ *Excellent Electrical Conductivity*
+ *Good Mixing and Processing Characteristics*
+ *Reinforcement Superior to HAF Blacks*
+ *Pelletized to give* *Cleanliness*
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Recommended for

CONDUCTIVE BELTS
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CABOT

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REDUCE BLISTERING FASTER

in your processing with SOLKA®-FLOC

Just use 20 volumes of SOLKA-FLOC—the newest, most modern form of cellulose—to replace an equal volume of mineral filler.

Controlled shrinkage . . . reduced nerve . . . sharper designs . . . harder, smoother surfaces . . . easier processing are other results frequently obtained with SOLKA-FLOC.

As a processing aid in the manufacture of such products as tiling, soling, matting, molded goods, extruded goods, etc., SOLKA-FLOC has proven invaluable. It could mean a better product, bigger profits for you.

Find out more about this versatile product and its use in processing. Write Technical Service, Dept. FG-4, at Boston for recommendations and samples.

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General Sales Offices:
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SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS
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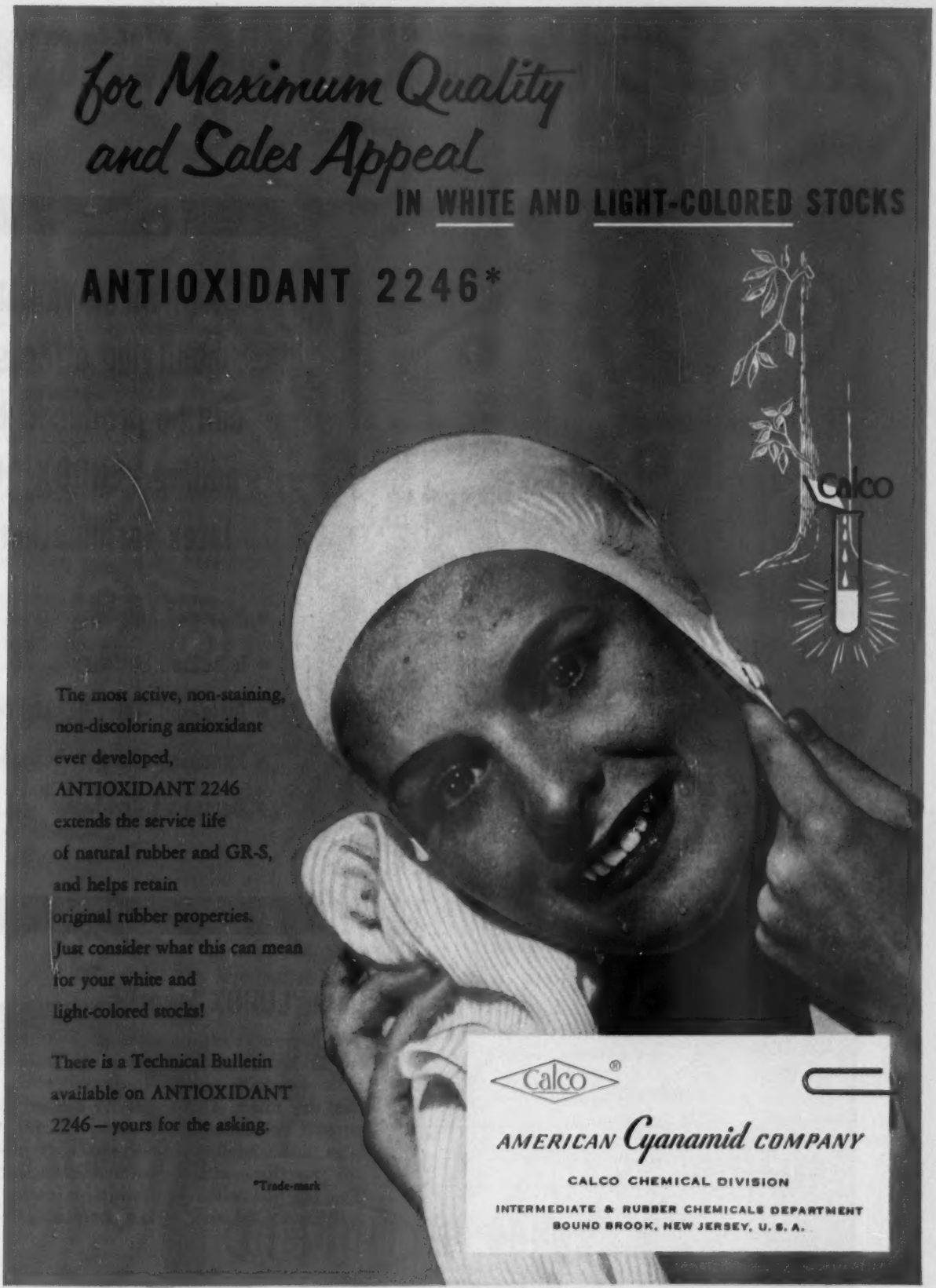
for Maximum Quality and Sales Appeal

IN WHITE AND LIGHT-COLORED STOCKS

ANTIOXIDANT 2246*



The most active, non-staining, non-discoloring antioxidant ever developed, ANTIOXIDANT 2246 extends the service life of natural rubber and GR-S, and helps retain original rubber properties. Just consider what this can mean for your white and light-colored stocks!

There is a Technical Bulletin available on ANTIOXIDANT 2246 — yours for the asking.

*Trade-mark

Calco®

AMERICAN *Cyanamid* COMPANY

CALCO CHEMICAL DIVISION

INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT

BOUND BROOK, NEW JERSEY, U. S. A.

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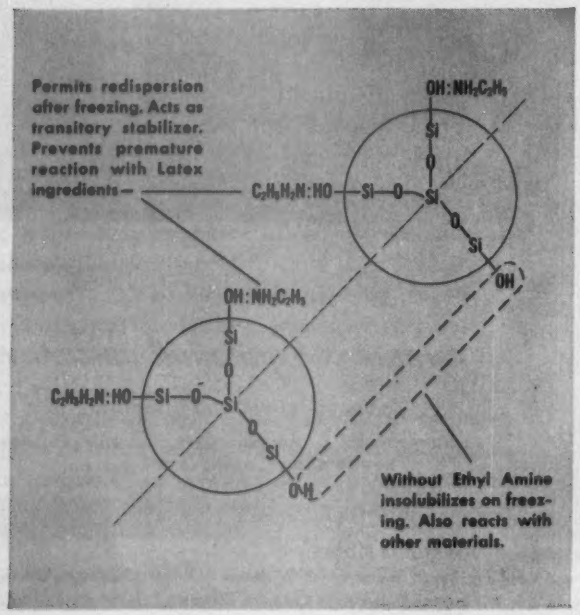
Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill.
H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

How Du Pont "LUDOX" can

What "LUDOX" is

"Ludox" is a 30% colloidal solution of almost pure amorphous silica particles (SiO_2) in the form of polymerized silicic acid. The electron photomicrograph—magnification 175,000 times—shows the fineness and uniformity of "Ludox" particles. The average particle's size of 17 millimicrons is below the range of the best carbon blacks.


Permits redispersion after freezing. Acts as transitory stabilizer. Prevents premature reaction with Latex ingredients—
OH:NH2C2H5
C2H5H2N:HO—Si—O—Si
Without Ethyl Amine insolubilizes on freezing. Also reacts with other materials.

Any of these valuable modifying effects can be produced by adding "LUDOX" to latex formulations

- Improved Adhesion
- Increased Stiffness
- Increased Water Resistance
- Increased Abrasion Resistance
- Decreased Dry Tack

How "LUDOX" works

The diagram at left shows surface hydroxyl groups on "Ludox" particles. These groups make the particles chemically reactive in contrast to commonly used dry fillers. This reactivity has led to many unusual properties and uses for "Ludox" in the latex field. The diagram also shows a typical "Ludox" reaction—with and without monoethylamine. The reaction with ethyl amine is useful in the stabilization of some latices containing "Ludox."

improve latex products

Your chemists can create new combinations of properties in latex-dipped goods, coatings, adhesives . . . whatever products you make—using Du Pont "Ludox"* colloidal silica. And new properties can mean new sales advantages —new markets for your products.

Here are some examples of how "Ludox" has improved latex products:

Neoprene thread was produced with a nearly doubled modulus over the entire range of elongation. Seven parts of "Ludox" were added per 100 parts neoprene latex. Modulus can be increased, too, in natural rubber films.

In neoprene-coated belting, adhesion was improved and flaking stopped by adding "Ludox." In a paper saturant, abrasion resistance was increased 20 to 40%!

A natural-rubber adhesive was doubled in strength of leather-to-leather adhesion when 20 parts of "Ludox" solids were added per 100 parts natural rubber latex solids. Such outstanding improvements have also led to the use of "Ludox" in GRS and neoprene latex adhesives and coatings.

An uncured Buna N solvent coating on cloth had no surface tack whatsoever when treated with "Ludox." In decreasing or eliminating tackiness, "Ludox" can be applied as an aftercoat or, in the case of latex, incorporated in the compound.

Neoprene films have shown exceptional increases in water resistance and decreases in water swelling upon addition of 20 parts "Ludox" solids per 100 parts neoprene latex solids.

Neoprene foam required about 20% less solids to attain a given modulus when 5 parts of "Ludox" solids were added per 100 parts dry neoprene. This saving of raw material was obtained without affecting flex life, bend flex, or compression set.

In these and other cases "Ludox" has provided combinations of properties difficult to achieve by any other means.

What's more, a little "Ludox" goes a long way.

To learn more about how silica chemistry with Du Pont "Ludox" can help improve your products, mail the coupon below, or write on your letterhead today.

*REG U S PAT OFF.

Send for this informative booklet: "'LUDOX' in the Rubber Industry"

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department, Wilmington 98, Delaware

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Address_____

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DU PONT "LUDOX" COLLOIDAL SILICA

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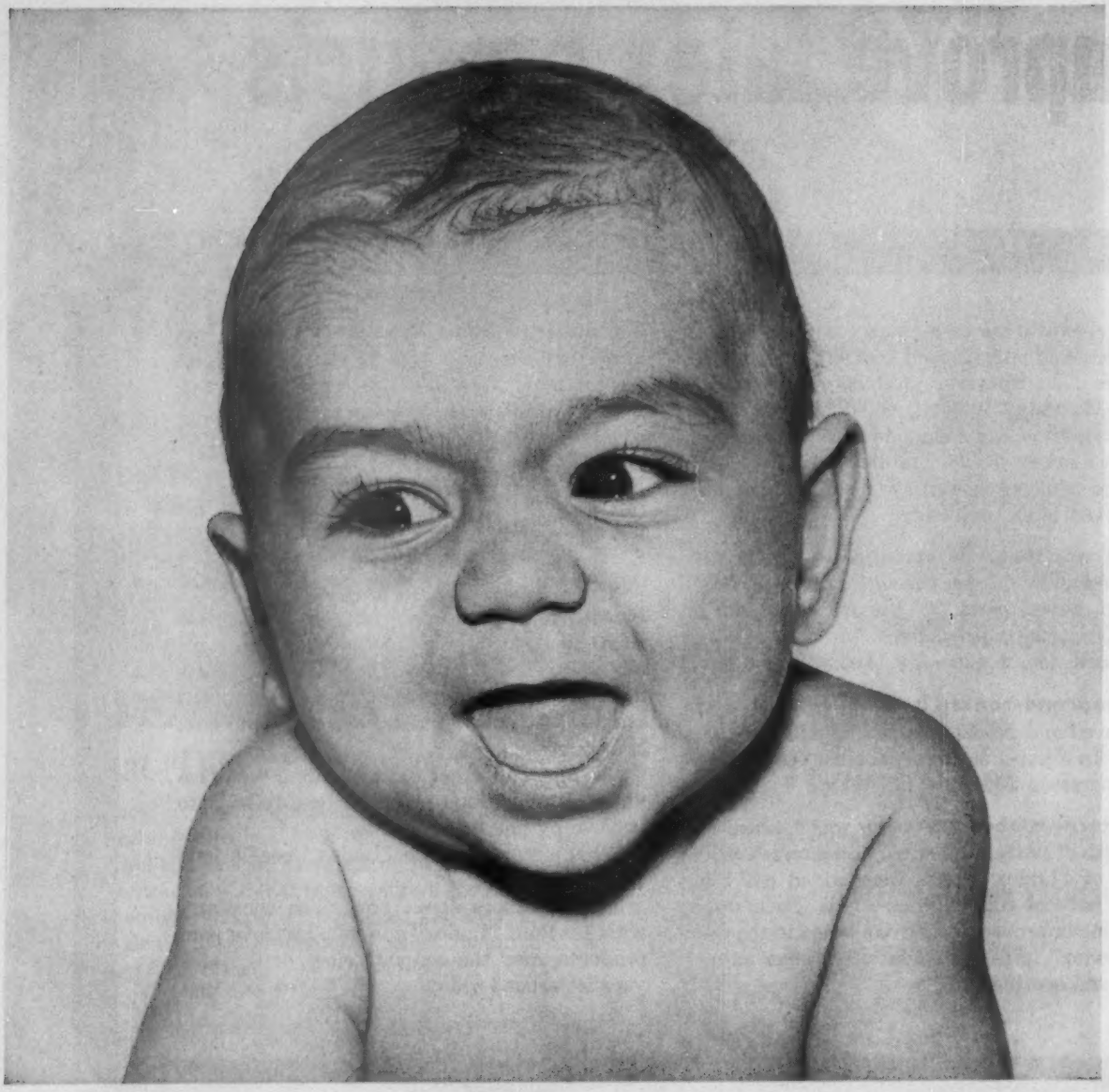
BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY



Confound you, Smathers! When I ask for Barrett, I mean Barrett

BARRETT IS BASIC... It pays you to buy from Barrett—the world's leading producer of coal-tar chemicals. You are assured uniform quality, steady supply and quick delivery.

Services of the Barrett Applications Research Laboratory are available without cost to customers requiring assistance on application problems.

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Dispersing Oil 10
CUMAR* Paracoumarone-Indene Resin
BRC* 20 Rubber Compounding Pitch
"BRC" 30 Rubber Compounding Pitch
BRV* Rubber Softener
BRT* 3 Rubber Reclaiming Tar
"BRT" 4 Rubber Reclaiming Tar
Resin "C" Resinous Compounding Material
Dibutyl Phthalate
ELASTEX* 28-P Plasticizer (DOP)
"ELASTEX" 10-P Plasticizer (DIOP)
"ELASTEX" DCHP Plasticizer
"ELASTEX" 50-B* Plasticizer

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A Bright future for White Walls!
WITH UNITANE 0-220
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CALCO CHEMICAL DIVISION
PIGMENT DEPARTMENT
BOUND BROOK, NEW JERSEY
BRANCH OFFICES AND WAREHOUSES IN PRINCIPAL CITIES

A tricky twist IN RUBBER SHOWS THE VALUE OF COLUMBIA-SOUTHERN'S hi-sil®

Faced with the problem of developing a light-grey rubber compound to meet an extremely exacting usage, the General Tire & Rubber Company found that only one non-black reinforcing pigment would meet requirements.

That pigment is Hi-Sil, product of Columbia-Southern research.

General's problem was presented by Bendix Home Appliances, in connection with the revolutionary design of its Economat automatic washer. The heart of this washer is the "Metexaloy Wondertub"—a flexible rubber tub which is collapsed by vacuum pressure, to drain the dirty wash water and then, following the final rinse, to squeeze the water gently and firmly from the clothes.

Obviously, the rubber compound must possess great tensile strength, resilience and resistance to creasing, scuffing and abrasion in order to stand up under this twisting, squeezing action. And in production, which involves one of the trickiest of all rubber molding jobs, the compound must have unusually high tear resistance. Only Hi-Sil, among all non-black pigments, imparted these characteristics to the rubber.

The successful performance of the Bendix Economat is a tribute to the ingeniousness of its designers and to the skills of General Tire & Rubber in producing rubber products to meet special requirements. Columbia-Southern is proud that the unique properties of Hi-Sil have thus again proved their value in helping to solve difficult rubber compounding jobs.

WRITE TODAY FOR FURTHER INFORMATION

If you have a problem which you think may be solved through the use of Hi-Sil or either of its companion pigments—Silene EF and Calcene—please write to our Pittsburgh Office. They will be glad to furnish complete data and working samples if you wish.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY

EXECUTIVE OFFICES: FIFTH AVENUE AT BELLEFIELD, PITTSBURGH 13, PA.
DISTRICT OFFICES: BOSTON, CHARLOTTE, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, HOUSTON, MINNEAPOLIS, NEW ORLEANS, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS, SAN FRANCISCO

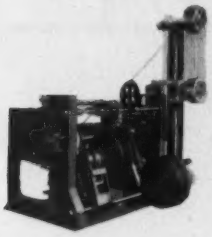
SODA ASH • CAUSTIC SODA • LIQUID CHLORINE • SODIUM BICARBONATE CALCIUM CHLORIDE • MODIFIED SODAS • CAUSTIC POTASH • CHLORINATED BENZENES • RUBBER PIGMENTS (Hi-Sil, Silene EF, Calcene TM) MURIATIC ACID • PERCHLOREETHYLENE • PITTCHLOR

PAY-OFF

Equipped to take reels up to 36" in diameter. Cam-and-lever lift from floor. Mechanism is automatically self-braking, with brake activated by any slackening of wire speed. Rugged construction.

DAVIS-STANDARD CAPSTAN

Drag and pulling type. Supplies for almost all wire plant needs. Aluminum or cast iron drums, grooved or flat, in any radius desired. Gear reducers standard, four-speed transmission optional.



NEW-TYPE TAKE-UP

Great new efficiency. Quiet, vibrationless. No gears or clutches. Operates positively at high speeds. Reel drive by multiple V-belts. Automatic brake. Totally new traverse mechanism. Speed range choice for constant tension control. Built in two sizes: for reels 12" to 24" and 24" to 36".

CONTINUOUS VULCANIZER

Heavy duty model assures uniform curing at high production rate. Made in 3¼", 4½", and 6" bore sizes for hot or cold fed compounds.

When is an Extruder an *Excluder*?

When it's a DAVIS-STANDARD

Let our engineers confer with yours to arrive at the soundest, most efficient installation for your operation.

When you purchase superior extrusion equipment, you *exclude* troubles. That's why more and more companies are installing Davis-Standard extrusion equipment. They know that it pays to buy extruding machines from the world's largest manufacturer of custom-made extrusion equipment for rubber and thermoplastics.

Davis-Standard extruders assure high-velocity extrusion, maximum operating efficiency, and are available with accessory units which mean satisfying, profitable production.

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MOLDING PRESSES AND EXTRUSION MACHINES

World's Largest Manufacturers of Custom-Built Extrusion Machines

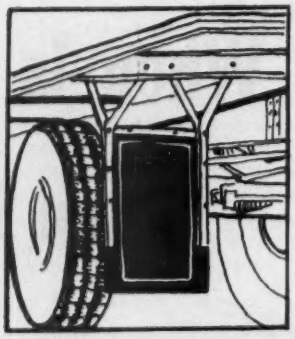
Export Office: Ballagh & Thrall, Independence Square, Philadelphia 6, Pa.

FOR TRUCK

SPLASH GUARDS

USE

Pequanoc MOCCASIN



Truck splash guards take a real "beating." That's why many rubber manufacturers use Pequanoc **Moccasin** Reclaim in their splash guard compounds. Here's a typical formula with costs and physical characteristics:

Moccasin Reclaim	62.60
Mineral Rubber	9.40
Zinc Oxide	.85
Soft Clay	5.80
FEF Black	15.10
Antioxidant	.35
MBTS	.50
DOTG	.25
Plasticizing Oil	4.30
Sulfur	.85
	100.00

Est. Lb. Cost	$.0835
Sp. Grav.	1.32
Vol. Cost	$.1102
Tensile	750-800 p.s.i.
Elong.	225-250%
"A" Durometer	78

•

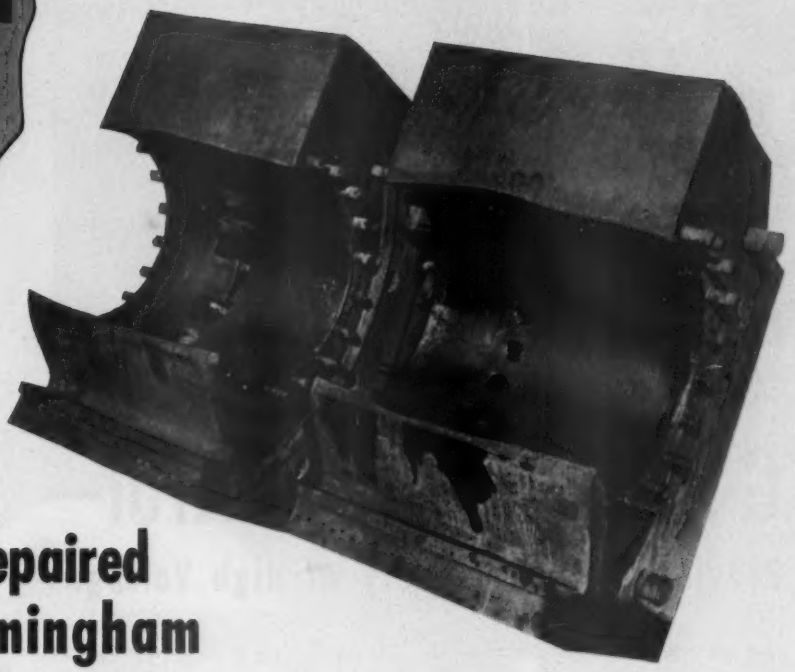
We'll gladly send you a test sample of **Moccasin.** Write for it today.

Pequanoc Rubber Co.

MANUFACTURERS OF RECLAIMED RUBBER

MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

Don't junk those Banbury sides



they can be repaired by Farrel-Birmingham

Banbury mixer sides as badly worn as these can still be salvaged by boring and welding in new wear-resistant liners. This is the latest F-B method for rebuilding Banbury sides. However, where the wear has been slight, the older method of rebuilding with hard-surfacing metal and finishing to size is also satisfactory.

In either case—*when the repair work is done by Farrel-Birmingham*—the rebuilt side will be just as good as a new one, and will carry the same guarantee.

You can rely on Farrel-Birmingham for your Banbury mixer repairs and rebuilding. As the sole manufacturer of the machine for thirty-six years, the company has the unequalled experience, facilities and know-how to return a worn machine to its original work capacity. It is the only company having the necessary drawings, jigs, fixtures and gauges for satisfactory repairs.

For the best in Banbury repair work, write, wire or telephone one of the offices listed below.

FREE INSPECTION SERVICE

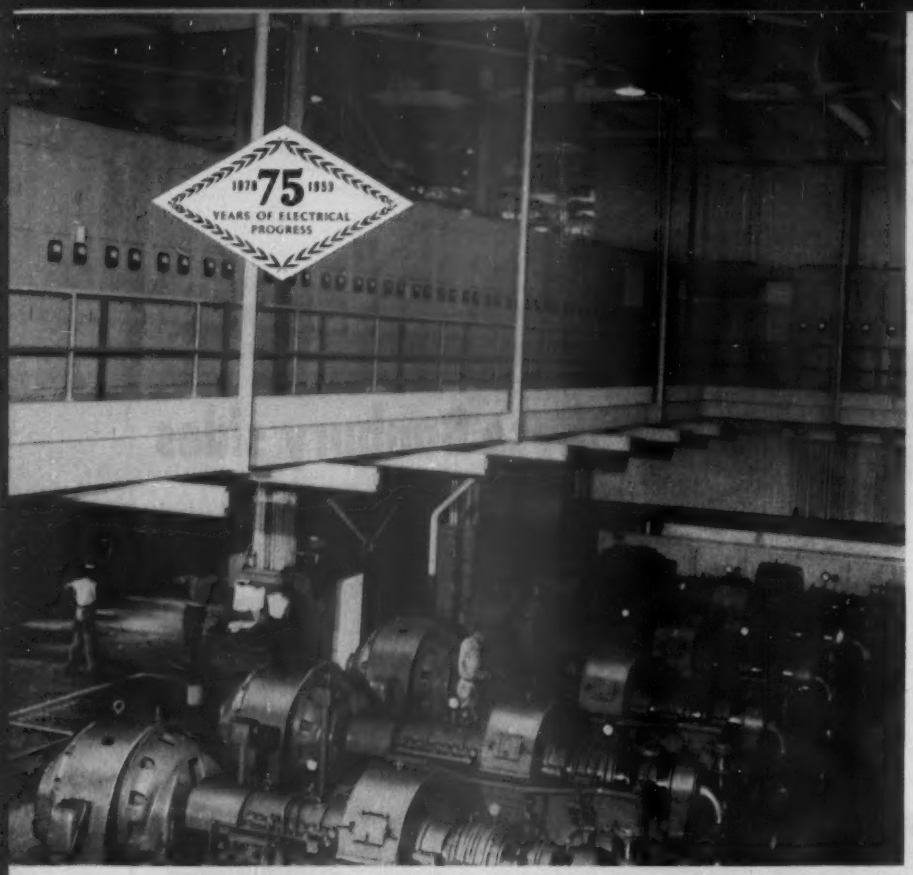
A complete and competent inspection service, by factory-trained mechanics, is available to all users of Banbury mixers in the United States. A request will bring an inspector to your plant, promptly and without cost to you. He will examine your machines thoroughly, report to you on their condition, and recommend exactly what needs to be done to put them into first-class shape.

FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONN. (Telephone Ansonia 4-3331)
AKRON, OHIO, 2710 First National Tower (Tel. Jefferson 3149)
CHICAGO, ILLINOIS, 120 So. LaSalle Street (Tel. Andover 3-6434)
LOS ANGELES, CALIF., 2032 Santa Fe Avenue (Tel. Lafayette 3017)
HOUSTON, TEXAS, 860-A M & M Building (Tel. Preston 4472)

FB-818

Farrel-Birmingham®



G-E LIMITAMP controls operation of synchronous and induction motor drives—will protect equipment under short-circuit conditions as high as 250,000 KVA.

G-E Limitamp Control—

Provides Greater Safety At High Voltages

G-E Limitamp is a high voltage motor starter providing interrupting capacity up to 4800 volts . . . gives you quick, silent short-circuit protection for motors up to 2250 hp.

Heavy duty air-break contactors with improved arcing structure permit a rapid duty cycle for millions of operations . . . require little maintenance.

High interrupting capacity plus fast-acting, specially developed EJ-2 fuses, (which limit fault current to less than ¼ cycle,) provide complete motor protection . . . prevent costly shutdowns.

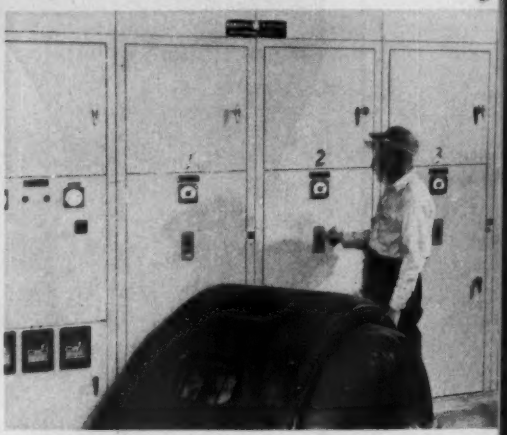
For safety of maintenance personnel high and low voltage compartments are separated by a steel barrier. Mechanical door interlocks assure motor circuit interruption before the fuse compartment door can be opened.

G-E engineers study your requirements . . . design all components into a co-ordinated "package" that will give you adequate interrupting capacity for your system.

G-E Limitamp controls are delivered totally assembled, ready for service and need only be put in place, the leads connected, fuses inserted . . . the control is ready to operate.

For complete information contact your G-E Representative, or write for Bulletin GEA-5409A, General Electric Co., Sec. 781-3, Schenectady 5, N. Y.

MAINTENANCE IS EASY—for example: arc shutes can be removed quickly, contact tips inspected, and your Limitamp control is right back in operation.



SIMPLE TO OPERATE—G-E Limitamp control permits pushbutton operation for manual starting and stopping while meters provide a quick check on load.

FUSES ARE EASILY REPLACED—when the fuse swings forward on its hinge, it is easily lifted out and quickly replaced with the help of a switch hook.

You can put your confidence in—

GENERAL ELECTRIC

CONTROL

Dials and recorders keep automatic check on temperatures and pressures throughout General Atlas plants – to guarantee the same pellet perfection, exceptional performance from every shipment of Pelletex.

Control Laboratories at points of manufacture constantly evaluate Pelletex throughout every step of production, maintaining further control of the production process. A central Referee Laboratory, examining periodic production samples, assures uniform testing.

Fully equipped Cabot rubber laboratories test Pelletex rubber compounds on various types of modern testing apparatus.

GENERAL ATLAS DIVISION
of Cabot Carbon Company

GODFREY L. CABOT, INC.
77 Franklin Street
Boston 10, Mass.

CABOT

PELLETEX

For Rubber Compounding Use VELSICOL RESINS

NOW AVAILABLE IN VARYING MELTING-POINT RANGES AND COLORED GRADES

SOME SUGGESTED APPLICATIONS:

- Mechanical Goods
- Electrical Insulation Compounds
- Rubber Shoe Soles and Heels
- Rubber Floor Tiling
- Gaskets and Jar Rings
- Rubber Adhesives and Cements
- Molded Rubber Products
- Tubular Compounds
- Reclaimed Rubber Sheeting
- Colored Rubber Stocks
- Battery Cases
- Hard Rubber Compounds

FEATURES:

1. THERMOPLASTIC HYDROCARBON RESINS.
2. COMPATIBLE WITH NATURAL AND SYNTHETIC RUBBERS.
3. EFFECTIVE PLASTICIZERS AND SOFTENERS . . . in highly-loaded clay stocks or in recipes incorporating carbon black.
4. MILL READILY.
5. EXCELLENT DISPERSING AGENTS FOR FILLERS AND PIGMENTS.
6. FACILITATE PROCESSING PROCEDURES . . . impart excellent milling, calendering processing and tubing characteristics to stocks.
7. IMPART EXCELLENT PERFORMANCE CHARACTERISTICS . . . such as good tensile strength, elongation and modulus, as well as good resistance to abrasion and aging.
8. POSSESS HIGH ELECTRICAL RESISTANCE PROPERTIES.
9. AID IN THE DEVELOPMENT OF NON-SCORCHY STOCKS . . . without excessive retardation of cure at high temperatures.

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VELSICOL

Precision platens either steam or electrically heated. Parallelism and uniform heat distribution rigidly maintained.

R.D. Wood Heating Platens

Long experienced in the design and manufacture of press heating platens, R. D. Wood Company supplies units in every practical size for every practical application.

These rolled steel heating platens meet the most exacting requirements in the processing of all types of rubber and plastics, the manufacture of plywood, veneers, wallboard, hardboard, pressed woods, and various types of composition flooring.

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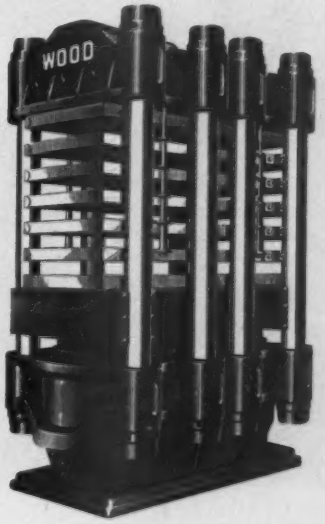

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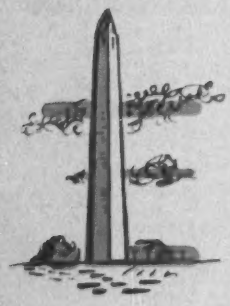

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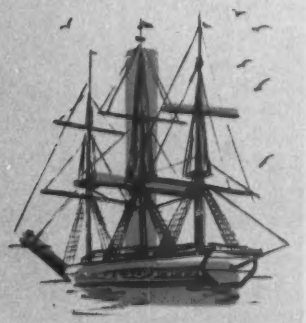

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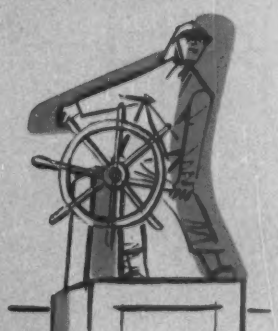

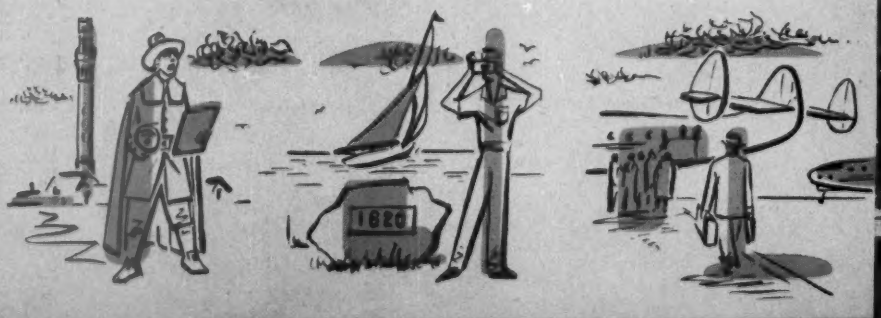

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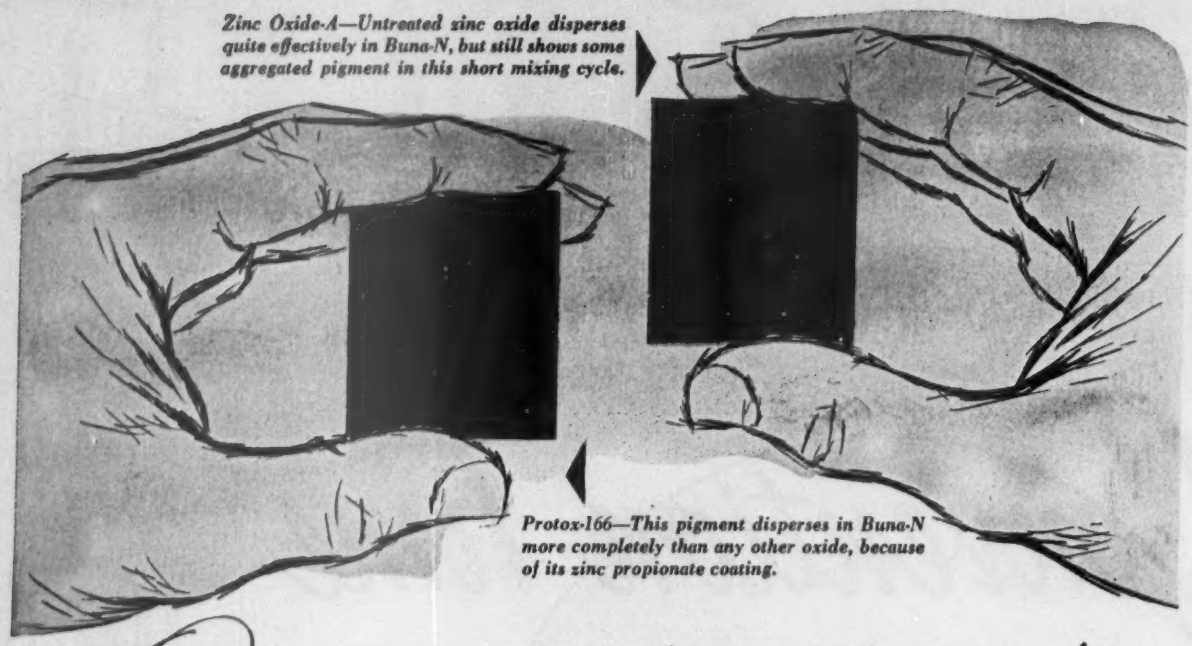

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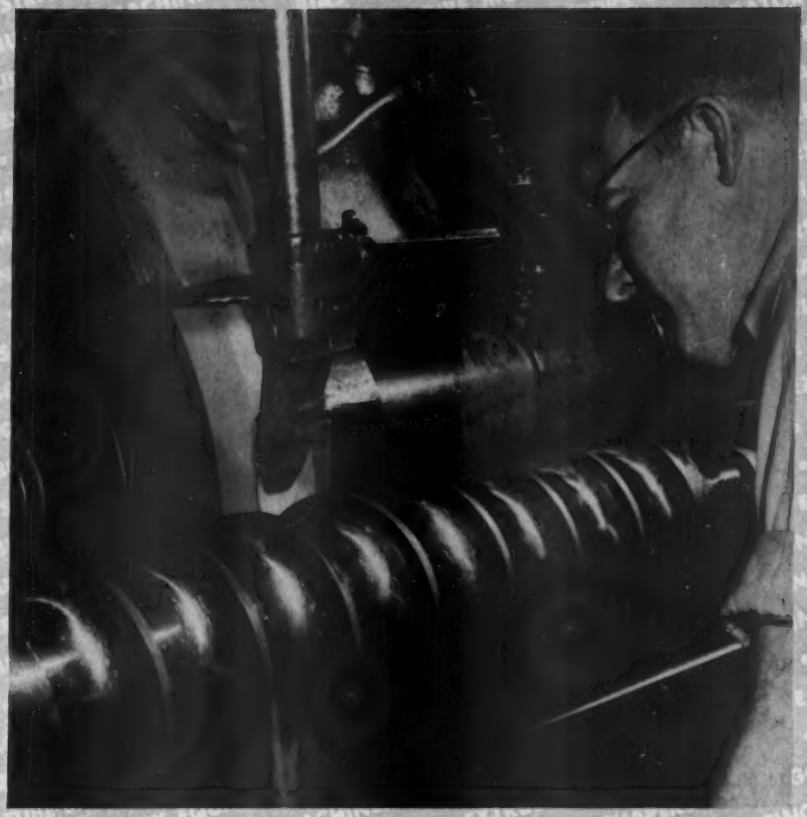

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E. L. Cal. Mag.	1.2	1.2	1.2	1.2
Neozone D	0.5	0.5	0.5	0.5
Stearic Acid	1	1	1	1
NA-22	0.3	0.3	0.3	0.3
Zinc Oxide	10	10	10	10
SRF Black	2	2	25	60
Circo. Light Process Oil	35	25	—	—
Neophax A	30	—	—	—

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Elongation, %	450	700	550	500
Volume Swell (30 days at 80°F), %				
SR-6	71	45	56	50
Methyl Ethyl Ketone	58	51	61	55
Acetone	5	15	25	20
Ethyl Acetate	38	35	46	38

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3. Add all the dry powders.
4. Add the Neophax A and oil.

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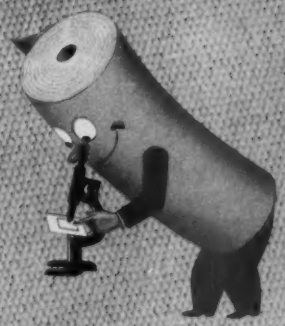

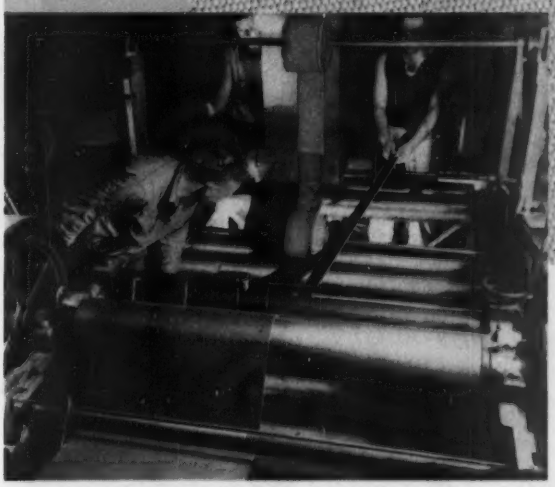

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CONTENTS FOR APRIL, 1953

Zinc Oxide in Latex: Part 2—The Influence of Zinc Oxide on Colloidal Stability—*By H. C. Jones and C. A. Klaman* . . . 63

Reports on Avoidable Accidents in Rubber Plants 70

Wet Blasting Process for the Cleaning and Finishing of Rubber Molds—*By Eugene F. Anderson* 71

Natural Rubber versus GR-S: A Panel Discussion 73

Lockfoam—A Multi-Purpose Liquid Plastic 80

Vulcollan—The New Polyester Rubber—*By Frederic Popper* 81

●

REGULAR DEPARTMENTS

Book Reviews	124	Los Angeles News	110
Canadian News	112	Names in the News	94
Chemical Prices	132	New Equipment	116
Classified Ads	143	New Goods	108
Coming Events	92	Obituaries	114
Editorials	84	Rubber, Cotton Markets	130
Financial News	106	Statistics	*

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RUBBER AGE

Vol. 73, No. 1 APRIL, 1953

Zinc Oxide in Latex

II—The Influence of Zinc Oxide on Colloidal Stability

By H. C. JONES and C. A. KLAMAN

Research Department, New Jersey Zinc Co. (of Pa.), Palmerton, Pa.

PART I of this paper *(1)* considered the effect of wide variations in the physical and chemical properties of zinc oxide on the viscosity and settling characteristics of aqueous suspensions with several dispersing agents. In physical properties, the surface area ranged from approximately 3 to 4, 8, and 10 square meters per gram as determined by nitrogen adsorption measurements. The chemical properties showed the normal differences between American and French process brands, the former being characterized by a moderate sulfur and water-soluble salts content, and the latter by high chemical purity with a minimum of sulfur and other impurities.

In the case of the American process oxides, where it is not practical to manufacture a wide range of surface area variation, the range was only 3 to 4.4 square meters per gram in surface area, while in the case of the French process types the variation was from approximately 3.9 to 8 and 10 square meters per gram. The properties of propionic acid-treated XX-4 (American process) zinc oxide were also studied. In this case, the surface has been substantially converted to a coating of zinc propionate. The conclusions of this work were as follows:

(a) The viscosity and settling properties of the aqueous zinc oxide slurries are definitely associated with the extent of the pigment surface and the nature and the amount of wetting agent.

(b) High slurry viscosity was imparted by oxides of greater surface area and these slurries settled the least.

(c) Conversely, the coarser particle size oxides, i.e., those with a lower surface area, had a lower slurry viscosity and exhibited more settling.

(d) The extent of grinding of the zinc oxide in water influenced the viscosity of the zinc oxide suspensions. Severe grinding developed a lower viscosity slurry than a milder type of pigment incorporation.

More recently the French process oxides, Kadox-72 and Kadox-15, have been made available with propionic acid treatments. The former has been designated Protox-168 and the latter Protox-169. The improved wetting properties of these pigments should prove of definite interest to latex processors. When the propionic acid-treated pigments are added to water, they diffuse throughout the water in a spectacular manner, indicating an ease of wetting that is not apparent with untreated zinc oxides. Furthermore, less wetting agent is required to develop comparable viscosities with the treated than the untreated oxides.

An outstanding advantage of the coated oxides is the ability to handle slurries of higher zinc oxide concentration than is possible with untreated oxides. For example, slurries having desirable viscosity and settling characteristics for processing in a latex foam operation can be prepared with 50 parts of Protox-169, while the same pigment concentration with the untreated base

TABLE I—BROOKFIELD VISCOSITY AND SETTLING TESTS ON AQUEOUS SUSPENSIONS OF PROTOX-169 AND KADOX-15

Colloid Milled 5 Minutes

Protox-169	600	900	—
Kadox-15	—	—	600
Tamol N [a]	12	18	12
Water	900	900	900
% ZnO	40	50	40
pH	7	7.1	9.1

Brookfield Viscosity

Days After Mixing	Centipoises [b]		
1	24.6	78.5	All
2	28.0	72.6	Values
5	28.2	79.0	Over
8	24.2	67.0	500
12	20.0	88.7	

Settling Tests

Days After Mixing	ZnO Level [c]		
1	97	98	99
2	95	97	99
5	88	93	98
8	81	90	98
12	73	86	98

Ball Milled 24 Hours

Protox-169	400	600	—	—
Kadox-15	—	—	400	600
Tamol N [a]	8	12	8	12
Water	600	600	600	600
% ZnO	40	50	40	50
pH	7.1	7	8.9	9.2

Brookfield Viscosity

Days After Mixing	Centipoises [b]		
1	19.5	59.9	All
4	23.7	51.8	Values
7	22.0	45.1	Over
11	22.0	49.2	500

Settling Tests

Days After Mixing	ZnO Level [c]		
1	98	99	These
4	86	95	Are
7	79	91	Thick
11	70	87	Pastes

(a) All suspensions contain 2% Tamol N based on zinc oxide content. (b) No. 1 spindle at 20 rpm. (c) In 100 cc. graduated cylinder.

oxide Kadox-15 will yield a heavy paste that could not be transported in a pipe line and pumping system. Brookfield viscosity measurements listed in Table I support this statement where 40 and 50% zinc oxide suspensions of Protox-169 have a relatively low viscosity while similar preparations with Kadox-15 yielded heavy pastes. The foregoing remarks apply exclusively to aqueous zinc oxide suspensions. Natural rubber latex stability and viscosity changes in contact with zinc oxide is the subject of the present report. The various types of zinc oxide discussed are identified in Table II.

Nature of Latex Particle

A discussion of natural rubber latex stability should be prefaced by some comments concerning the nature of the latex particle. It consists of a minute globule of rubber hydrocarbon surrounded by a non-rubber envelope, the composition of which is a complex of proteins, sterols and fatty acids. Baker *(2)* has pointed out that modification of the surface layer occurs immediately after tapping by bacterial and enzyme action and more markedly on ammoniation of the latex for preservation.

In ammoniated latex, fatty acids liberated from their combination with sterols tend to displace protein from the surface of the globules into the serum and, in addition, surface protein is continually being removed by hydrolysis under alkaline conditions during the life of the latex. The ratio of soap to protein in the composition of the protective coating surrounding the rubber globules therefore increases with age. Degradation of the surface protein and serum substances continues, however, leading to the formation of ammonium salts of water-soluble acids in the serum. The amount of water-soluble acids varies considerably in commercial shipments of latex, depending upon age, degree of ammoniation, extent of initial bacterial contamination and enzyme activity.

Acid serum substances, including ammonium salts of amino acids, increase the solubility of zinc oxide owing to the formation of positively charged divalent zinc ammonium complex ions. These are attracted to the surface of the negatively charged rubber globules where they form insoluble zinc proteinate and zinc soaps by chemical reaction with the outer protective soap-protein layer which thereby becomes partially desolvated, leading to thickening and eventual coagulation of the latex.

A distinction is made between the mechanical and chemical stability of a latex system. The mechanical stability is the amount of mechanical agitation that a latex system will withstand before coagulation, while the chemical stability is a measure of the tolerance of the latex emulsion for chemical reagents and coagulants. Although some latices will show a parallel behavior in that they will possess both high mechanical and chemical stability, it does not necessarily follow in every instance. Some aged latices will have a high mechanical stability despite the fact that they contain a high amino acid content due to the hydrolysis of the protein and yet they will have a low chemical stability owing to the increased zinc oxide reactivity and consequent insolubilization and loss of the fatty acid stabilizer. The high level of mechanical stability may be associated with the protective action of the soap layer which gradually displaces the protein layer on the latex globule during the aging of the latex.

TABLE II—IDENTIFICATION OF ZINC OXIDES

ZnO	Process of Manufacture	Type	Surface Area (Sq.M./Gm.)
XX-4	American	Untreated	4.4
Protox-166	American	Treated	4.4
XX-50	American	Untreated	3.0
Kadox-15	French	Untreated	10.0
Protox-169	French	Treated	10.0
Kadox-72	French	Untreated	7.9
Protox-168	French	Treated	7.9
XX-78	French	Untreated	3.9

Mechanical Stability

The mechanical stability test as described by the American Society for Testing Materials *(3)* was primarily designed for the grading of uncompounded rubber latices. In this investigation, an attempt was made to use the mechanical stability test in the study of latex-zinc oxide systems. Five per cent zinc oxide based on the solids content of the latex is placed with the latex in a 4-ounce square bottle 1⅜-inch on a side and 4⅜-inch high and subjected to the action of a small propeller rotating at 10,000 to 14,000 rpm. A Hamilton-Beach mixer was used for this purpose. The end point is taken when some coagulated latex appears and the motor speeds up owing to the sudden reduction in the motor load.

Zinc oxide was introduced into the latex for the mechanical stability test in preliminary tests both in the dry form and as ball-milled slurries. There were no significant stability differences between the two methods. For convenience and accuracy in handling, the zinc oxide was added in the dry form to the latex.

Mechanical stability values for a series of zinc oxides in latex are shown in Table III. The measurements were taken on the latex as received with a pH of 10.1. Determinations were also made with the latex first adjusted to a pH of 11.1 and 12.1 with KOH before the addition of the zinc oxide. At a pH of 10.1, zinc oxide reduced the stability to about one-sixth that of the latex alone. There were no significant stability differences among the several zinc oxides in the latex-zinc oxide systems. When the pH was increased to 11.1, the stability in the presence of zinc oxide was substantially improved. It is noteworthy that at a pH of 12.1 the mixes with zinc oxide had essentially the same mechanical stability as the control without zinc oxide. There was an indication that the propionic acid-treated oxide, Protox-166, imparted a slightly lower stability to the latex at the high pH levels.

When the original latex was adjusted to a pH of 11.1 and 11.8 with ammonia, the mechanical stability of the system in the presence of zinc oxide was very much lower than with KOH adjusted to approximately the same pH levels*. The mechanical stability of the zinc oxide at pH 11.1 and 11.8 with ammonia was only slightly higher than that of the zinc oxide-bearing mixes at 10.1 pH. The pH of the original latex was reduced to 8.8 by treatment with CO_2 or formaldehyde. With the former, the stability of the mix was lowered somewhat, while in the case of the formaldehyde addition the values were approximately the same as the control determinations at 10.1 pH. It is noteworthy that the latex adjusted to a pH of 11.8 without zinc oxide had a substantially higher mechanical stability than any of the latex mixtures in the series.

All of the mechanical stability results reported were on a single batch of 40% solids latex and in these tests the reproducibility in the high speed stirring measurement was ±5%. In subsequent tests with other latices, the determination was quite disappointing from a reproducibility standpoint. The latter observation seems to more nearly conform with the experiences of latex compounders who are dealing with a variety of latices from different sources.

* It would have been desirable to adjust both latex systems to 12.1 pH with NH_4OH and KOH, but this would have caused excessive dilution with the weaker alkali, NH_4OH.

TABLE III—MECHANICAL STABILITY IN SECONDS TO COAGULATION

	Latex Adjusted to pH of						
	A	B	C	D	E	F	G
	10.1	11.1	12.1	11.1	11.8	8.8	8.8
	Seconds to Coagulation						
Latex	300	555	580	585	1300	160	70
Latex + XX-4	55	335	555	120	90	55	25
Latex + Kadox-15	45	370	560	105	90	55	25
Latex + XX-50	60	345	580	105	80	60	30
Latex + Kadox-72	55	360	550	120	90	55	25
Latex + XX-78	60	375	550	115	95	60	30
Latex + Protox-166	55	310	480	105	85	55	25

NOTES

A—pH of latex as received; B and C—pH adjusted with KOH; D and E—pH adjusted with NH_4OH; F—pH adjusted with formaldehyde; G—pH adjusted by gassing with CO_2.
KOH number of latex, 0.84.
Centrifuged latex, 60% solids, reduced to 40% solids for stability measurements.
1 gram (5% on solids in latex) of zinc oxide in 50 cc. of 40% latex.

TABLE IV—CHEMICAL STABILITY OF LATEX-ZINC OXIDE SYSTEMS

	Brookfield Viscosity—No. 1 Spindle at 20 R.P.M. (Days After Mixing)						pH of
	1	13	27	49	107	210	Mix
Latex	44	25	25	26	27	26	10.5
Latex + XX-4	34	32	34	38	33	37	10.6
Latex + Kadox-15	36	36	36	38	37	39	10.8
Latex + XX-50	31	31	32	33	31	29	10.7
Latex + Kadox-72	32	34	35	35	34	36	10.7
Latex + XX-78	30	31	31	33	26	34	10.7
Latex + Protox-166	32	33	34	36	34	36	10.6
Latex + Protox-168	33	36	32	34	31	30	10.8
Latex + Protox-169	41	43	42	45	42	49	10.8

NOTES

Rubber from latex, 100; zinc oxide, 5.
Water added to make 50% solids.
Mixes stored and tested in constant temperature room at 25°C.
Latex-KOH No. 0.46. The chemical stability studies were made with Naugatuck NC-401 62.2% solids natural rubber latex.

Chemical Stability

When latex is stored in contact with zinc oxide for periods of time there is a progressive thickening of the latex until finally the entire mass coagulates. Apparently the thickening or viscosity increase of a latex emulsion is a preliminary stage of coagulation. In this investigation, the change in Brookfield viscosity of the latex with storage time is taken as the index of chemical stability.

Aqueous suspensions of zinc oxide were added to a centrifuged latex that had been reduced from 62 to 50% rubber solids and the viscosity determined periodically with the Brookfield instrument. The results listed in Table IV show no evidence of thickening or coagulation after 210 days' storage in closed Mason jars. To speed up the test, the ammonia content of the same latex was reduced by an aeration treatment which lowered the mechanical stability of the latex alone from 262 to 89 seconds, the pH from 10.3 to 7.75, and the per cent alkalinity from 1.37 to 0.19%. The centrifuged latex had a total solids content of 61.6% originally and after the aeration treatment, which consisted of 30 hours' stirring with a laboratory stirrer, the solids content increased to 66.5%. A sample of this latex in a closed jar coagulated in 15 to 17 days while a portion of this emulsion with 5% zinc oxide and adjusted to 50% rubber solids did not coagulate in 26 days.

In the next experiment, chemical coagulants were used

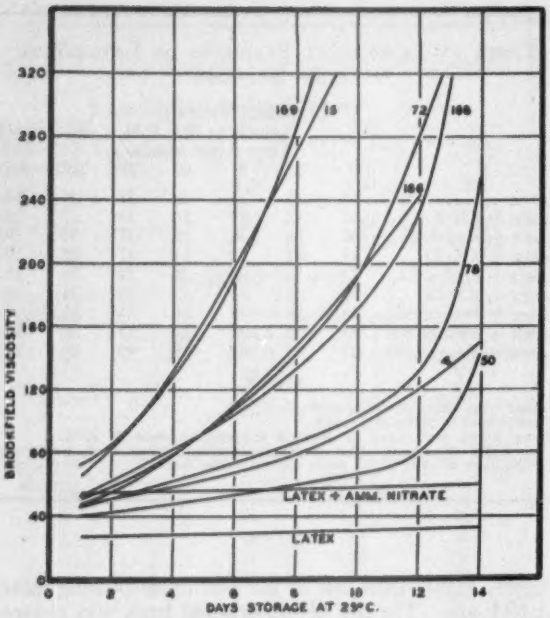

FIG. 1—Influence of of zinc oxides on the chemical stability of latex containing 1% NH_4NO_3

to hasten the destabilization of the latex. A series of suspensions was prepared with 1% ammonium nitrate based on the rubber content and the viscosity-time curves are charted in Figure 1. The actual measurements are listed in Table V.

Noticeable differences in viscosity with the several zinc oxides were observed after three to four days and the stability differences between the zinc oxides became more pronounced with longer storage intervals. Kadox-15 and Protox-169, the zinc oxides with the highest surface area (Table II), exhibited the greatest rate of viscosity change and presumably were more reactive with the latex than the other zinc oxides. Kadox-72 and Protox-168, having an intermediate surface area, showed a less rapid rate of viscosity change, while XX-78, having the least surface area, effected the least rate of change in viscosity of the several oxides derived from zinc metal, namely, the French process type zinc oxides.

The American process zinc oxides, XX-4 and XX-50, influenced viscosity in the order of surface area; XX-4, having a higher surface area, showed a greater viscosity change than XX-50. Although XX-4 has more surface than the French process oxide, XX-78, the former did not change the viscosity as much as the latter. This discrepancy is not explained. The propionic acid-treated American process oxide, Protox-166, was somewhat more reactive than the base oxide, XX-4, while in the case of Protox-168 and Protox-169 there were no appreciable viscosity differences between the treated and the untreated grades.

The control samples with and without ammonium nitrate and no zinc oxide showed no change in viscosity in a 14-day interval. Ammonium nitrate increased the viscosity of the latex 25 to 30 centipoises and there was no further change with storage time. The presence of ammonium nitrate and zinc oxide in the mixes reduced the pH an insignificant amount.

The same group of zinc oxides was examined for chemical stability in latex to which was added 1% $(NH_4)_2SO_4$ based on the rubber solids content (Table VI, Figure 2). Again the oxides with the greatest surface area, Kadox-15 and Protox-169, were the most reactive and the pigment with the lowest surface area, XX-50, was the least reactive, as determined by Brookfield viscosity changes. The other zinc oxides were intermediate in reactivity except Protox-166, which thickened slightly slower than Protox-169 and Kadox-15. Ammonium sulfate had no thickening effect on the latex without zinc oxide. There was a slight lowering of pH resulting from the addition of $(NH_4)_2SO_4$ to the latex emulsion.

Owing to the wide usage of sodium silicofluoride as a gelation agent in latex foam manufacture, this material was investigated. A number of experiments were tried, all of which were unsuccessful, presumably due to the high gelation speed of this reagent. There appeared to be no transition period; either the latex would gel instantaneously or there was no thickening at all.

Zinc oxide was heated in contact with the latex to hasten the destabilization of the latex. The viscosity data on these 50% rubber solids slurries charted in Figure 3 and shown in Table VII, presented some interesting information. Zinc oxide was added to the

TABLE V—CHEMICAL STABILITY OF A LATEX-ZINC OXIDE SYSTEM CONTAINING 1% NH_4NO_3 BASED ON THE RUBBER SOLIDS

	Brookfield Viscosity—No. 1 Spindle at 20 R.P.M. (Days After Mixing)								pH of Mix
	1	2	3	6	7	8	12	14	
Latex	26	30	26	27	27	28	28	29	10.4
Latex + NH_4NO_3	54	57	57	56	55	57	56	59	10.2
Latex + NH_4NO_3 + XX-4	48	53	53	69	72	83	109	152	10.3
Latex + NH_4NO_3 + Kadox-15	71	88	102	198	234	278	444	Coag.	10.3
Latex + NH_4NO_3 + XX-50	41	43	46	54	58	57	80	144	10.1
Latex + NH_4NO_3 + Kadox-72	52	61	68	107	125	157	210	396	10.1
Latex + NH_4NO_3 + XX-78	46	49	52	73	82	86	132	256	10.2
Latex + NH_4NO_3 + Protox-166	47	63	62	116	115	161	245	Coag.	10.3
Latex + NH_4NO_3 + Protox-168	53	66	70	111	111	144	228	425	10.1
Latex + NH_4NO_3 + Protox-169	64	88	95	194	218	284	770	Coag.	10.1

NOTES

Rubber from latex, 100; zinc oxide, 5; NH_4NO_3, 1.
Water added to make 50% solids.
Mixes stored and tested in constant temperature room at 25°C.
pH measured 10 days after mixing.

TABLE VI—CHEMICAL STABILITY OF A LATEX-ZINC OXIDE SYSTEM CONTAINING 1% $(NH_4)_2SO_4$ BASED ON THE RUBBER SOLIDS

	Brookfield Viscosity—No. 1 Spindle at 20 R.P.M. (Days After Mixing)								pH of Mix
	1	2	4	7	9	10	11	14	
Latex + $(NH_4)_2SO_4$	30	25	31	33	29	29	30	29	9.93
Latex + $(NH_4)_2SO_4$ + XX-4	43	49	47	91	176	244	Coag.	—	—
Latex + $(NH_4)_2SO_4$ + Kadox-15	48	48	74	200	Coag.	—	—	—	—
Latex + $(NH_4)_2SO_4$ + XX-50	42	40	44	60	92	106	126	Coag.	—
Latex + $(NH_4)_2SO_4$ + Kadox-72	42	47	58	99	192	229	Coag.	—	—
Latex + $(NH_4)_2SO_4$ + XX-78	36	42	48	67	197	134	243	Coag.	—
Latex + $(NH_4)_2SO_4$ + Protox-166	49	41	54	115	441	Coag.	—	—	—
Latex + $(NH_4)_2SO_4$ + Protox-168	36	44	47	71	163	232	Coag.	—	—
Latex + $(NH_4)_2SO_4$ + Protox-169	45	50	74	247	Coag.	—	—	—	—

NOTES

Rubber from latex, 100; zinc oxide, 5; $(NH_4)_2SO_4$, 1.
Water added to make mix 50% solids.
pH measured 14 days after mixing.
Mixes stored and tested in constant temperature room at 25°C.

latex and the mixture sealed in one-quart Mason jars and heated for intervals of 6, 12, and 18 hours in a water bath at 55° C. The samples were allowed to cool overnight before the jars were unsealed. The viscosity differences were in the order of the heating intervals, the 18-hour heat treatment yielding a higher viscosity than the 12-hour treatment which, in turn, had a higher viscosity than the 6-hour treatment. After subsequent storage at 25° C. for 40 days, some increase in viscosity was noted and beyond this point the rate of viscosity change was greater with the sample heated 18 hours than with the 12-hour heat treatment. It may be of some significance that the heat-treated samples had a high initial viscosity which was proportional to the extent of heat treatment. After the second day of storage, however, the viscosities leveled off and remained unchanged for a considerable time before thickening set in.

Zinc Oxide Solubility Experiments

It is well established that the destabilizing effect of zinc oxide on latex is related to the zinc oxide solubility in that medium since it is the divalent zinc ion (Zn^{++}) going into solution in the latex serum that is responsible for coagulation. The latex system is complex, and it was thought that a simple solubility determination on zinc oxide in contact with alkali and salt media might throw some light on the stability mechanism. A logical approach to the problem was to determine the zinc oxide solubility over a pH range that would include most latex systems.

The solubility experiments were set up with 6 grams of zinc oxide in 200 cc. distilled water in stoppered Erlenmeyer flasks. Before introducing the zinc oxide, the pH had been adjusted to several pH levels between 7.0 and 12.0 with ammonia and KOH. The mixtures were shaken daily over a 10-day period, filtered, and the zinc in solution determined polarographically. For information on polarographic analysis, reference is made to the textbook by Kolthoff and Lingane *(4)*. From a pH of 7.0 to 10.5 with ammonia, the zinc solubility was 0.001 to 0.007 gram per liter, with a sharp increase beyond this point to 7.1 grams per liter at pH 12.0. Over the same pH range with KOH, the zinc solubility varied from 0.001 to 0.01 gram per liter (Table VIII).

Solubility measurements on a series of zinc oxides in ammonia are listed in Table IX. The solubility characteristics of the oxides were, in general, similar in that they had a minimum solubility in the pH range of 10 to 10.5 (region B, Figure 4), a low order of solubility in the pH range below this point (region A), and sharply increasing solubility from 10.5 to 12.0 pH (region C). Walsh *(5)* reported a similar solubility curve for zinc oxide in alkaline solution.

The American process oxides had somewhat higher solubilities than the French process oxides owing to the basic zinc sulfates on the surface of the former. The propionic acid treatment on the Protox grades also contributed to a higher zinc solubility. These comments apply to region A. At pH 12.0, the zinc solubilities of the French process oxides were in the order of their surface area values, Kadox-15 having a somewhat higher solubility than Kadox-72, which in turn was more soluble than XX-78.

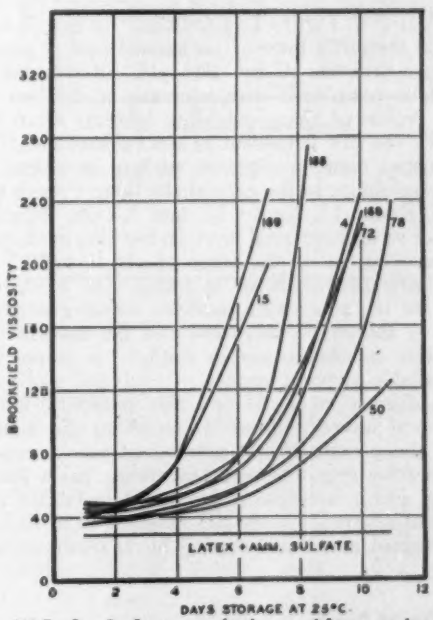

FIG. 2—Influence of zinc oxides on the chemical stability of latex containing 1% $(NH_4)_2SO_4$.

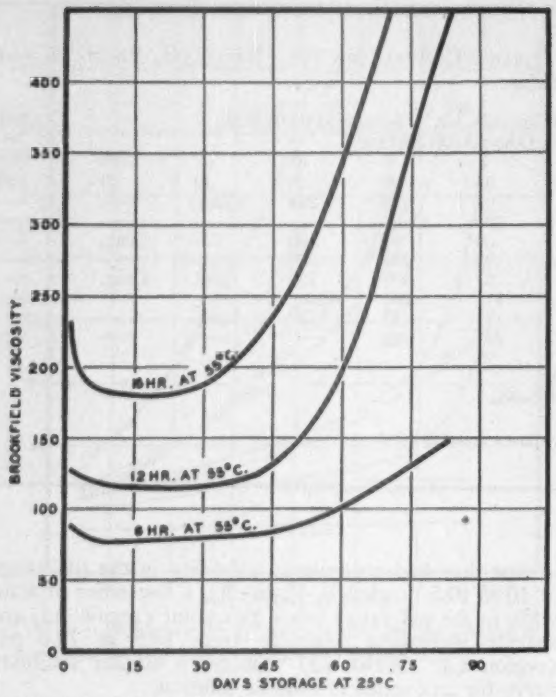

FIG. 3—Effect of heat on the chemical stability of a latex-zinc oxide system.

The influence of exposure time on zinc oxide solubility was determined by immersing Kadox-15 for 5, 10, and 20 days. Essentially the same amount of zinc oxide went into solution in water in the 5-, 10-, and 20-day intervals. Zinc oxide solubility was increased from two-fold to five-fold by the addition of ammonium nitrate, ammonium sulfate or ammonium chloride (0.12 grams per 100 cc. water) to the pigment slurries (Table IX).

The following interpretation is suggested for regions A, B, and C in Figure 4: Essentially no zinc is in solution and therefore little or no ionized zinc is present in the range between 10 and 10.5 pH. Below this point, the zinc is complexed with ammonia as divalent Zn^{++}. In the region of sharp solubility increase from 10.5 to 12.0 pH, the zinc is present as zincate ions ZnO_2^{--}. The relationship between pigment surface area and extent of zinc solubility in the case of the three French process oxides, Kadox-15, Kadox-72, and XX-78, suggests the presence of an interfacial layer on the zinc oxide particle. It is believed that in the range of pH 10 to 10.5 a gelatinous zinc hydroxide or hydrated zinc oxide coating forms on the zinc oxide particles which gradually dissolves as the pH is increased and the amount of zinc going into solution as zincate ZnO_2^{--} is proportional to the available pigment surface.

In a discussion of pH and zinc solubility, it may be of general interest to call attention to the manner in which these experiments parallel corrosion experience with metallic zinc. The metal invariably has a thin oxide coating, and it is noteworthy that the metal has the best corrosion resistance in the pH range of 10 to 10.5, where the hydrated zinc oxide coating has a minimum solubility.

Discussion of Results

The mechanical stability measurements on latex in contact with zinc oxide listed in Table III indicate that the test has a limited value insofar as differentiating between the various grades of zinc oxide is concerned. However, the data demonstrated that zinc oxide has a definite influence on the mechanical stability of the latex system, and the effect produced by 5 parts of zinc oxide on 100 parts of rubber solids is believed to be primarily a chemical rather than a physical effect. It seems probable that the physical impact of the zinc oxide particles with the rubber globules at the relatively low zinc oxide concentration level in the mechanical stability test would be much less effective than the ionic influence of the zinc oxide.

This view is further supported by the mechanical stability values of the latex-zinc oxide mixes in the pH range of 11 and 12. In fact, the results show a close parallel with zinc oxide solubility measurements. With ammonia at the high pH level, there is an appreciable zinc solubility which in conjunction with mechanical agitation promotes coagulation. Conversely, there is essentially no zinc in solution at a pH of 12 with KOH and the mechanical stability is excellent. Presumably, there is a common ion effect where the increased hydroxyl ion introduced by the KOH suppresses the NH_4^+ ion and the solubility influence of the latter ion is minimized.

pH had a marked effect on the mechanical stability of the latex without zinc oxide with the generalization that the higher the pH the better the mechanical stability. At the higher pH levels, ammonia produced more stable emulsions than KOH, indicating that the nature of the interfacial film between the latex particle and the serum is influenced to a considerable degree by the type of alkali hydroxide added to the latex.

Dawson *(6)* presented considerable evidence showing the influence of the mechanical features of the stirring equipment and the latex properties on mechanical stability. An excellent review of the previous investigations on this subject is included in the paper.

The predominant effect of the latex in the chemical stability test is emphasized in the experiments reported in Table IV in which the viscosity of the latex remained

TABLE VII—EFFECT OF HEAT ON THE CHEMICAL STABILITY OF A LATEX-ZINC OXIDE SYSTEM

Dunlop 61.82% Latex [a]	800	800	800
Water [a]	190	190	190
Kadox-15 [b]	24.75	24.75	24.75
Hours in Water Bath at 55° C. After Mixing	6	12	18
	Brookfield Viscosity in Centipoises (No. 1 Spindle at 20 R.P.M.)		
Days After Mixing			
1	88.5	128.1	231.5
2	83.6	117.2	188.0
3	85.8	123.3	192.5
4	82.3	121.5	188.1
7	78.0	120.9	196.2
10	78.5	122.6	181.6
14	78.1	117.8	185.2
21	78.3	112.2	184.3
29	79.1	116.1	180.1
35	80.6	122.2	198.1
42	82.6	121.8	221.8
49	87.0	145.9	265.0
56	92.6	166.4	298.8
71	130.4	304.3	453.3
84	142.3	454.1	950.0 [c]

(a) Latex and water mixed to make 50% solids. (b) Equals 5% on rubber. (c) No. 1 spindle at 10 rpm.

unchanged for seven months despite the presence of zinc oxide*. When the pH of the same base latex was reduced from 10.3 to 7.8 by aeration, the latex retained a moderate degree of chemical stability in contact with zinc oxide. These results strongly suggest that reduction in pH is a secondary factor in emulsion stability compared to the presence of soluble ammonium salts in the latex system. Wren *(7)* investigated the effect of naturally occurring acidic serum substances in latex on the stability of this medium in contact with zinc oxide. He observed that the acidic substances likely to be found in latex serum increased the zinc oxide solubility in contact with ammonia. These materials markedly increased the thickening and eventual destabilization of the latex.

The influence of ammonium salts on latex stability is further substantiated by the results in Tables V and VI. In these series, the presence of 1% ammonium nitrate or sulfate reduced the thickening or coagulation time from seven months or more to one to two weeks. Furthermore, when the stability level of the latex was lowered, the effect of the several grades of zinc oxide became apparent. The zinc oxides with the larger surface area, that is, the finer particle size oxides, promote the thickening and gelation of latex more rapidly than the coarse particle size oxides.

The gelation or thickening which occurs when latex is heated is a well-recognized property that is utilized in some commercial latex operations. The data in Figure 3 for a zinc oxide-latex mixture indicate that factors influencing viscosity are operating in opposite directions simultaneously, and the following mechanism is suggested. The over-all effect of heating was to thicken the latex and this was proportional to the amount of heat. At the same time, a reduction in viscosity of the latex-zinc oxide mixture is taking place due to the elimination of the hydrated protein layer on the individual latex globules. The hydrolysis of the protein layer is accelerated by heat.

Baker *(2)* has called attention to the fact that the protective colloids on the surface of the latex globule are composed not only of proteins but fatty acids in combination with sterols. A second decomposition reaction, influenced by heat, may also be taking place at the interface between the latex globule and the serum. It seems probable that in contact with ammonia a saponification of the fatty acid sterol emulsifier sub-

* The chemical stability measurements were made with Naugatuck NC-401 latex, which, in addition to being a high purity centrifuged product, is believed to contain a supplementary stabilizing agent. The outstanding stability of the latex-zinc oxide system is probably associated, in part, to the added stabilizer.

TABLE VIII—EFFECT OF pH ON ZINC OXIDE SOLUBILITY

	pH Adjusted With NH_4OH		pH Adjusted With KOH	
pH of H_2O	pH of Filtrate	Grams ZnO/Liter	pH of Filtrate	Grams ZnO/Liter
7.0	6.88	0.006	7.21	0.012
7.5	6.84	0.006	7.03	0.006
8.0	7.03	0.006	6.92	0.005
8.5	6.92	0.005	7.05	0.006
9.0	7.59	0.001	6.90	0.011
9.5	7.55	0.003	7.49	0.004
10.0	9.41	0.001	7.17	0.004
10.5	10.52	0.007	9.42	0.001
11.0	11.13	0.224	10.68	0.001
11.5	11.80	0.990	10.80	0.002
12.0	12.60	7.100	11.60	0.001

Notes: 6 grams of Kadox-15 in 200 cc. of water (pH as above). Mixtures shaken daily for 10 days.

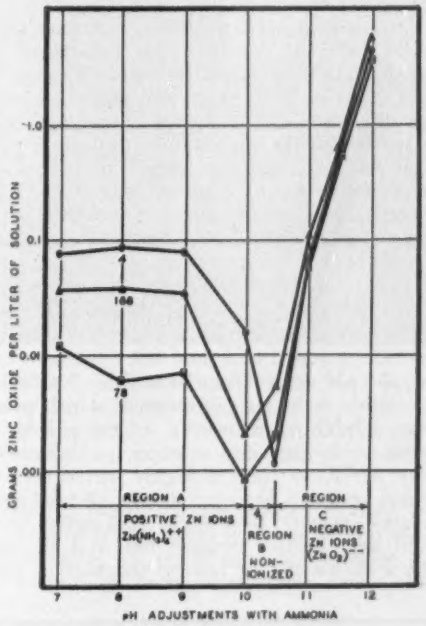

FIG. 4—Effect of pH on zinc oxide solubility.

TABLE IX—ZINC OXIDE SOLUBILITY IN AMMONIA OVER THE pH RANGE FROM 7.0 TO 12.0

	Grams Zinc Oxide per Liter pH of Water Adjusted with NH_4OH										
	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
XX-4	0.079		0.089		0.082		0.0160	0.0012	0.069	0.644	4.48
Protox-166	0.139		0.130		0.118		0.0560	0.0013	0.111	0.648	4.44
Kadox-15	0.006	0.006	0.006	0.005	0.001	0.003	0.0010	0.0070	0.224	0.99	7.10
Protox-169	0.065		0.063		0.058		0.0027	0.0057	0.119	0.709	4.89
Kadox-72	0.002		0.0026		0.0013		0.0009	0.0011	0.057	0.592	4.35
Protox-168	0.037		0.038		0.035		0.0021	0.0053	0.110	0.672	4.67
XX-78	0.012		0.006	0.004	0.007	0.006	0.0008	0.0020	0.016	0.53	3.75
Kadox-72 with 0.12 Gram NH_4NO_3			0.013		0.013		0.0022	0.0024	0.110		5.59
Kadox-72 with 0.12 Gram $(NH_4)_2SO_4$			0.012		0.010		0.0014	0.0019	0.140		5.59
Kadox-72 with 0.12 Gram NH_4Cl			0.016		0.014		0.0019	0.0028	0.245		7.10

stance occurs and the extent of this reaction would depend upon the heating interval. The fatty acid soaps resulting from the saponification reaction are still adequate emulsification agents but in contact with zinc oxide are converted to insoluble zinc soaps having no emulsion stabilizing effect. Hence the ultimate gelation of the latex-zinc oxide system is predetermined by the heating interval, the latex heated 6 hours having a much longer storage stability than those heated 12 and 18 hours.

Examination of the zinc oxide solubility data in Table IX suggests that the manner in which the soluble materials are associated in the system may have a pronounced influence on latex stability. The American process oxide, XX-4, without an ammonium salt additive, had a relatively higher water solubility than Kadox-*72* with the added ammonium salt. This was contrasted to the behavior in latex where XX-4 had a relatively slight destabilizing effect over a prolonged storage interval while the presence of the added ammonium salts with zinc oxide destabilized the latex system in a matter of several days.

The interpretation of these data is that the added ammonium salts are available for immediate reaction and destabilization of the latex, while the soluble zinc salts associated with the American process oxides exist as basic zinc compounds. In this form they do not so readily react with the protein and fatty acid protective agents on the rubber globules as with the added salts. It may also be that a greater concentration of $Zn(NH_3)_4^{++}$ ion is available for reactivity with the latex stabilizing agents as a result of the presence of the added ammonium salts.

The zinc oxide solubility data also contribute to a better understanding of some of the reactions occurring during the gelation of latex foam sponge. When sodium silicofluoride is added to a fluid latex foam rubber composition, the pH drops from 10 to 7.5. At the high pH the zinc oxide is in an environment which produces a minimum solubility. However, as the pH is lowered, some zinc oxide goes into solution, as indicated by the solubility curve, to form a highly active divalent zinc ammonium complex having a strong destabilizing effect on the latex system. In a recent publication *(8)*, Kraay and Van den Tempel pointed out that the zinc ammonium complex per se has no coagulation power but rather dissociates liberating zinc ions available for reaction with the adsorbed soaps on the rubber globules forming an insoluble zinc soap which links up the rubber globules into a gel. Evidence in favor of this mechanism was obtained by displacing the adsorbed natural higher fatty acids by a wetting agent which does not form an insoluble zinc soap, such as Igepon T. In this modified system, there was no indication of coagulation.

Present-day natural rubber latices are much more stable in contact with zinc oxide than those available before the war. The superior stability of the current materials is a credit to the modern plantation operators and is indicative of the extreme care that is exercised in producing high quality latices. It is the products of bacterial deterioration of latex and traces of mineral contaminants that are chiefly responsible for premature coagulation of latex emulsions.

This investigation was limited to a study of natural rubber latices stabilized with ammonia. Soap-emulsified latices, either natural or synthetic, are more stable in contact with divalent metallic ions and therefore do not present the stability problems encountered with ammoniated latex.

ACKNOWLEDGMENTS

The authors wish to acknowledge the helpful suggestions of numerous latex technologists in the rubber industry with whom the data were discussed at various stages of the investigation. These individuals are also thanked for their kind encouragement to continue a study which still needs much clarification. The technical assistance of Messrs. S. N. Roeder and E. A. Anderson was greatly appreciated.

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Reports on Avoidable Accidents in Rubber Plants

ADDITIONAL reports on avoidable accidents in rubber factories, as reported by the Rubber Section of the National Safety Council, follow herewith:

Mill Accident: A mill operator with twelve years experience attempted to remove a piece of wire which had clogged behind a travel strip knife on a mill without shutting down. The index finger of his right hand was pulled in contact with the knife, causing a severe cut on palm side of the finger. The injury resulted in later amputation of the index finger at the second joint. Investigation revealed that the wire was from a batch tag which had remained in the mill stock. The importance of shutting such equipment down can not be overemphasized. It's just human nature to reach for any foreign object.

Failure of Rupture Discs on Digesters: Of interest to plants having digesters is the following report of failure of rupture discs. Excessive internal pressures on two digesters were reported and the rupture discs installed did not blow at pressures considerably over the rating. An immediate check on all 12 digesters in this area disclosed that the rupture disc port was blocked solid with a build-up of charred rubber sludge completely around the inside of the dome. This condition also existed at the 4-inch manifold port from which the pressure gage is mounted.

The lesson learned is that the interior of the dome and openings to the manifold diaphragm ports must be completely cleaned. A flushing system is now being used by spraying warm water by pressure in the dome and also backflushing the 4-inch manifold. The vessels are being flushed immediately after each cook. This problem had not been encountered on the older type digesters because the rupture discs were mounted on the vessel head; besides they were not dome type vessels, and as a result the area was subjected to agitation. Failure to discover this problem in time might have resulted in serious explosion and possible injury.

Wet Blasting Process for the Cleaning and Finishing of Rubber Molds

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THE cleaning and finishing of rubber molds has, until recent years, been regarded as a long operation. The development of the wet blasting process has made it possible to save a lot of time, since work which formerly required hours to do can now be done in a few minutes.

It was formerly thought necessary to remove manually the foreign deposits left during molding operations, in order not to destroy close tolerances. Sharp edges in the mold, knurled points, and flat surfaces—all need to be protected so that they are not altered nor damaged, and only manual methods were deemed gentle enough for this work. It has now been determined, however, that even closer control over tolerances and surface quality can be obtained with wet blasting than was possible with scraping, burning, and other procedures customarily employed. Moreover, wet blasting can be used with all types of molds, whereas some of the other processes had limitations. Burning, for instance, could not be applied to molds made of aluminum.

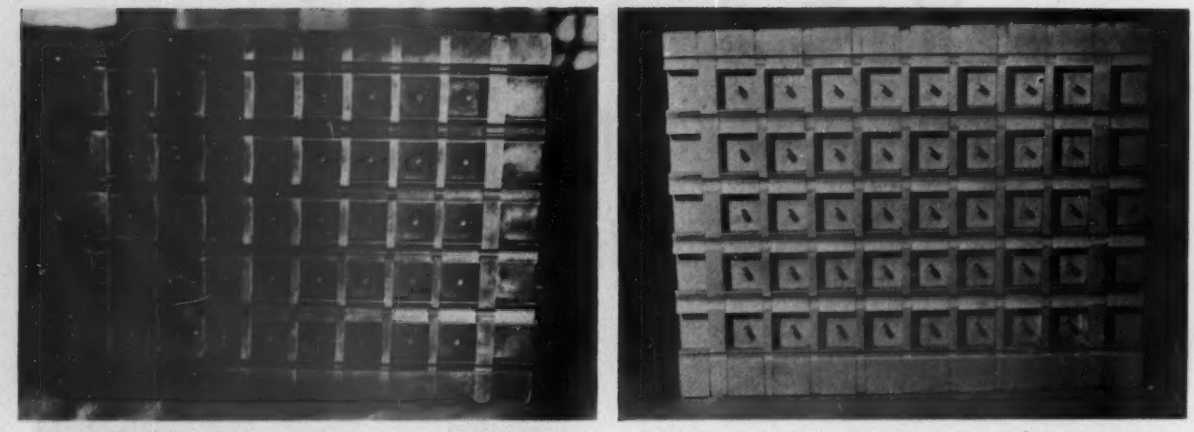
The wet blasting operation consists of very fine mesh abrasives being thrown in water suspension against the work. Since abrasives in the range of 80 to 2500 mesh are used, tolerances of .0001-inch can be maintained where required. The sharp edges and corners on the parting faces of the molds remain unaltered, so flash and joint lines are minimized. Lines or letters in a pattern remain unchanged. Knurled work can be completely cleaned without the points becoming dulled. Another important advantage is that "dishing" of the flat surfaces or the cavities does not occur like it sometimes does with other cleaning methods. The volume of the molded part is easily kept within specifications, and a waste of molding material due to enlarged molds is avoided.

View of a Liquamatte wet blasting machine, made by American Wheelabrator, designed for the handling of heavy molds. Work car inside rolls out onto rinse tank at right by means of tracks.

Wet blasting is valuable for molds that need to be repaired. It produces a matte-type surface on the metal. This surface does not reflect light nor produce glare, as do other types of surfaces, so workmen find it much less fatiguing to work on.

View of the inside of the blasting compartment during the cleaning of a heel mold. The rotating turntable on the work car makes it easy to manipulate the work in front of the gun.

Another view of the blasting compartment of a Liquamatte wet blasting machine during the cleaning operation. Small machine parts can also be cleaned. The door is normally closed during blasting.



Before and after views of a rubber mold. The photograph at the left shows the mold after service ready to undergo reconditioning. The same mold is seen at the right after 16 minutes and 45 seconds of wet blasting with 325 NE Liquabrasive. This mold is 10 inches high, 13 inches wide, and 1⅜ inches thick.

How Wet Blasting is Done

The wet blasting operation is done in metal cabinets, sized according to the requirements of the job, and the slurry mixture, composed of water, abrasive, and chemicals, is propelled at the work through a gun by means of compressed air. The pressure usually used is from 80 to 100 p.s.i. The operator stands outside of the cabinet, with his arms extended through armholes on the front of the machine, and manipulates the gun and work inside the machine with his hands, while operating the compressed air valve with his knee. The abrasive gun is held approximately 1½ to 2 inches from the work and at an angle of around 60° with it.

During the wet blasting operation, the operator is able to view the progress of his work through a vision window, and he inserts work into the cabinet and removes it through doors on the ends of the cabinet. However, with small parts, the operator can save himself a considerable amount of time by simply inserting and removing them through the armholes, if they are constructed so that the gloves he wears are unattached to the gauntlets. (Although small parts might not be met with rubber molds, some small parts of plant machinery might be reconditioned during a machine's free time). Unattached gloves have been more popular than attached gloves, for this reason as well as for reasons of health, since it is possible for each workman to have his own pair of gloves for avoiding contagious skin diseases.

Various types and models of machines are available for the blasting operation, and various kinds of accessory equipment are to be had, depending upon the requirements of the work. The machines range in size from bench models to large floor models, but for most rubber mold work a floor model about 4 feet in length and 3 feet in width is most satisfactory, except where very large and heavy molds are to be handled. In the latter case, machines with blasting compartments around 6 feet in length by 4½ feet in width are selected. Some have been designed to accommodate pieces up to 3500 pounds in weight.

The work conveyor inside the machine depends upon the requirements of the job. Where only the smaller molds which can easily be lifted and turned by hand are to be cleaned, no work conveyor at all is employed. An expanded metal floor in the blasting compartment serves as a work platform, and the operator turns the work over by hand. Where the heavier molds are to be cleaned, the cabinet is provided with tracks and a work car which runs on them. This car can also be equipped with a rotating turntable which greatly facilitates manipulating the work in front of the gun.

After the blasting operation, the molds are rinsed, either in hand rinse tanks or in a power rinse tank, with ferrous molds being rinsed in inhibited water. The hand rinse tanks are meant for the lighter molds that can be easily lifted by hand. These tanks are usually made available in pairs, one compartment for receiving the part immediately out of the blast chamber, and the other for a final rinse. For the heavier molds, power rinse tanks are available which have tracks on which the work car can be drawn out from the blasting compartment. The tank is filled with water and inhibitor, and a coolant-type pump raises the water through a hose. Power rinse tanks are convenient when chain hoists and other lifting devices are needed for loading heavy and bulky work. Both the hand rinse tanks and the power rinse tanks are available with immersion-type water heaters. Hot water makes parts dry faster, and there is less chance for oxidation of the metal.

Special types of abrasive and chemicals are needed for wet blasting, but because of the popularity of the process it is now possible to obtain all sizes of the various types of abrasive needed, plus necessary rust inhibitors and anti-packing chemicals, directly from manufacturers' stock. Considerable research has been done for determining which type and size of abrasive should be used for particular applications. We have found that for most rubber mold work, 325 or 140 mesh Liquabrasive is best; 325 mesh will handle most scale removal problems adequately, but where the tolerances on the part are not so critical, the coarser 140 mesh abrasive will make it possible to do a faster job.

Of course, the finish desired will determine which abrasive to use, and special problems require special treatment, so it is best to submit any kind of work to a manufacturer's demonstration laboratory where abrasive requirements can be determined by actual test. Among the wet blast chemicals which are available for immediate delivery is a new liquid-type inhibitor for easy dispersion into solution. Field experience shows that parts rinsed in water treated with this new inhibitor dry virtually without water stains.

Natural Rubber versus GR-S

A Panel Discussion Held at the January 30, 1953, Meeting of the Akron Rubber Group

THE Akron Rubber Group held an interesting panel discussion on "Natural Rubber versus GR-S" on January 30, 1953, at the Mayflower Hotel in Akron, Ohio. Dr. Henry F. Palmer (Kentucky Synthetic) acted as moderator for the symposium. Panel members included A. E. Hosier (Faultless Rubber), C. Boyd Cook (Wooster Rubber), Daniel Reahard, Jr. (General Tire), John E. Brothers (Ohio Rubber), T. A. Riehl (Goodyear), and Harold Niemeyer (Firestone). The questions asked of the panel, and the answers given, appear below:

Question—Are there any major plans for large sized natural rubber planting in the Far East?

Answered by Dr. Palmer: This is a very difficult question to answer with any authoritativeness. Apparently most of the large estates are going ahead actively with substantial replanting programs and the Natural Rubber Bureau has reported that Malayan smallholders have been embarking on a replanting program. There also appears to be a definite native replanting effort. For some years Malaya has been levying against all natural rubber exports and will start a program to plant a half million acres for benefit of the natives. Obviously the replanting which starts from now on is not going to have any effect on the supply until 1960 and later, but if there is reasonable political stability in the Far East it is likely there will be a greater production expansion than many in the industry anticipate.

Question—What is the long range outlook, price-wise, of GR-S and of natural rubber?

Answered by Dr. Palmer: If one knew the answer to this question he would have no more financial problems, to say the least. However, assuming money values approximate what they are today it seems to be the opinion of many that the average type of GR-S will sell for no less than 25c and probably no more than 30c per pound under private industry operation. It is also likely that No. 3 smoked sheets will approximate this price on the average with certain market fluctuations to be expected. Oil extenders and synthetic rubbers will likely be 3 to 5c per pound cheaper.

Question—At what price differential would natural rubber be used to replace GR-S in passenger tire treads?

Answered by Mr. Niemeyer: There would be a temptation to change from GR-S to natural rubber whenever the market price was lower than the price of GR-S. In my opinion natural rubber would have to be considerably below GR-S to justify its use in passenger tire treads because of the better tread wear and better resistance to tread cracking we now obtain with cold GR-S. It is difficult to set an exact price differential at which this change would be made as it will depend on the attitude of management, profit position on tires, and pressure from moves made by competition.

We should certainly keep in mind what any wholesale change to natural rubber would mean to our synthetic industry and our national security. We don't want to reduce the use of synthetic to the point where the Government would step in and re-establish end-product specifications in an M-2 order. When the industry starts increasing the use of natural rubber as it did late last year the increased demand quickly reacts on the rubber market and the price goes up. So you not only pay a higher price for the additional rubber you use but you pay a higher price for all the rubber you use.

Answered by Mr. Reahard: At a very substantial savings for natural rubber, it would not replace cold GR-S in premium or first-quality passenger tires. In second-line tires, natural rubber would probably replace GR-S when the price differential was three to five cents in favor of natural rubber.

Answered by Mr. Riehl: GR-S has firmly established itself as a material for use in passenger tire treads. This was done not on an economic basis but on a quality basis. We do not feel that under the normal range of price levels we would now anticipate a shift from GR-S back to crude rubber in passenger tire treads unless there is an industry move in this direction.

Question—At what price differential would cold GR-S be used to replace natural rubber in truck tire treads and in what sizes and types of truck tires?

Answered by Mr. Niemeyer: With sufficient economic advantage cold GR-S could be used in small truck tires, possibly 7.50 and down.

Answered by Mr. Reahard: Small single bead truck tires of first-quality line would be considered in the same category as premium and first-quality passenger tires as mentioned above. Large single bead and twin bead highway truck tire treads through the 9.00 cross-section would be made from natural rubber until the price differential approached 10 cents a pound in favor of GR-S.

Answered by Mr. Riehl: GR-S and crude rubber are directly competitive in such truck tires as would be used in moderate to easy service. In this classification you might include all tires from sizes 7.50 and down; also such tires as are used on city busses, truck airwheels and possibly some off-the-road tires in the smaller sizes. GR-S does not match crude

rubber in quality and performance in large size truck and inter-city bus tires and unless conditions of extreme shortage occurred, GR-S would not be used in this service under any foreseeable price differential at the present time. This was illustrated in the past two years when the price of crude rubber went to very high levels after the start of the Korean War and the industry still continued to use crude in the large size truck tire.

Question—At what price differential would GR-S replace crude (and to what extent) in passenger tire carcasses?

Answered by Mr. Niemeyer: GR-S is almost the full equal of natural rubber in passenger tire carcass performance particularly in the large volume small sizes. Hence, GR-S would replace natural rubber when there is any economic advantage whatever. However, I think at equal costs the tire industry should tend to keep GR-S in to give support to our synthetic industry.

Answered by Mr. Reahard: At a very substantial savings for GR-S, it would not replace natural rubber in large premium and first-quality line tires. In the smaller first-quality and second and third line passenger tires, GR-S would replace approximately 70% of the crude rubber in the carcass compounds when the price differential was 4 to 5 cents in favor of GR-S. In small first-quality and second and third line tires, the GR-S would replace all the natural rubber in passenger tire carcass when the price differential was from 8 to 10 cents a pound in favor of GR-S.

Answered by Mr. Riehl: Crude rubber and GR-S both give equal performance when used in the carcass of passenger tires. Any conversion from GR-S to crude rubber would be influenced almost entirely by the economics of the change which would include such things as the relative cost of the two rubbers as well as processing factors involved.

Question—Assuming equal price and unlimited availability on GR-S and natural rubber, name the large volume end products in which GR-S would be preferred.

Answered by Mr. Reahard: If cold GR-S was available in unlimited quantities and the price equal to natural rubber, the large volume end-products where we would use GR-S would be passenger and small truck tread compounds and passenger tire camelback. In mechanical goods, it would be used to a limited extent in extrusions where tolerances are specified. The largest usage in mechanical goods, however, is in those products for the Armed Services where GR-S can be satisfactorily substituted for natural rubber. It is preferred in these applications to help make the Armed Forces independent of outside sources of raw materials in case of an emergency.

Question—Generally what is the equivalent in cost between GR-S and natural rubber? If natural rubber cost 30 cents what is a good price for GR-S?

Answered by Mr. Hosier: To arrive at a general or mean price equivalent between GR-S and natural rubber would require the statistical evaluation of industry-wide data. Different companies would no doubt arrive at different values depending upon the types of products produced, and different compounders would have different ideas depending upon their own philosophies of compounding and the local factors influencing their compounding. In the field of black compounds and those non-black heavily loaded with clays there is as much variation in volume of loading within one type of elastomer as there is between the two types. Therefore, in this field we might consider the cost of the basic polymers as about equal. The actual values would obviously depend on the grade of natural rubber involved.

In the field of non-black compounds, such as typical drug sundries stocks, it is necessary to use more expensive fillers with GR-S than with crude. If the crude is charged into such a stock at 30 cents, as specified in the question, a cold GR-S would need to be priced at 25 cents and a standard GR-S at 24 cents in order to obtain equal volume costs. This last 1 cent differential results from the fact that ultra-fine fillers are necessary with the standard GR-S while the cold GR-S yields good physicals with fillers of somewhat larger particle size than the ultra-fines. On today's market, with GR-S priced at 23 cents and No. 2 Pale Crepe at approximately 35 cents, the GR-S stock would run about 2 cents per pound cheaper than the natural rubber stock of the same specific gravity. With a cold GR-S this advantage may be realized almost in its entirety, but with standard types of GR-S much of the saving is lost in the extra processing necessary for satisfactory dispersion of the ultra-fine fillers.

Question—Very little trouble was ever encountered with crude rubber tread splices. Please describe material and procedures to obtain a GR-S tread splice which will not be noticeable after a tire has been in service for 5000 miles. Describe materials and procedures to obtain sidewall splices which do not open in service.

Answered by Mr. Riehl: As long as the tubed tread and sidewall are properly handled and cemented, we do not feel that a GR-S tread or sidewall presents any greater problem relative to open splices than did a crude rubber tread and sidewall. Care must be given to see that the stocks are carefully plasticized and tubed to avoid excessive shrinking, and an ordinary crude rubber-carbon black cement should be used to give sufficient tack at the splice. The workman, in making a splice, should permit no overlapping nor should he be required to put excessive tension on the tread or sidewall in order to make the actual union. The age of the treads, as well as their dryness, is always a factor and should the treads be too old, recementing is often considered advisable.

Question—What are the relative wearing qualities of passenger tires made wholly from each of the following three compounds: 100 percent natural crude rubber; 100 percent GR-S; and a combination of GR-S and crude rubber, each being used to its best advantage whether for carcass or tread?

Answered by Mr. Reahard: The relative wearing qualities of passenger tires are as follows:

Polymer	*Tread Wear*	*Carcass Durability*
100% natural rubber	100%	100%
100% GR-S	120%	75%
Combination of natural and GR-S	120%	100%

The 100% GR-S values are based on the fact that cold GR-S treads give improved tread wear, but the carcass durability is reduced because of separation in the carcass or between tread and carcass where carcass compounds using 100% GR-S are involved. In the combination of a crude carcass and a GR-S tread, it is possible to take advantage of the improved tread wear of cold GR-S and still maintain the good carcass durability of natural rubber.

Question—Is there a satisfactory all GR-S friction from the standpoint of frictioning and building "tack"? If so, what type?

Answered by Mr. Riehl: We know of no GR-S which will give satisfactory building tack. Koresin and Cumar in the GR-S will help some and it also has been felt that rosin acid GR-S may be somewhat better than fatty acid but our experience has not necessarily substantiated this. A GR-S friction will take a hot GR-S coat on square woven fabric satisfactorily. If the coat is to be put on cold and the fabric is to be built into a tire or other article with only frictioning, then a rubber cement is necessary for tack.

Question—In the addition of Syncera Wax to GR-S compounds for sunlight protection, how much is commonly used? How much wax on 100 GR-S is held in solution?

Answered by Mr. Riehl: The amount of wax used to give sunlight protection depends both on the type of GR-S and also the ultimate service into which the article is to go. Hot GR-S was in itself fairly resistant to weather aging and did not require the protection that cold GR-S does. With cold GR-S ½ to 1 PHR of a microcrystalline wax is about all that is necessary to give the protection desired. Should the compound be used in such an article as a molded strip for a car you might want to use as much as 6 parts of wax. The amount of wax that is held in solution in GR-S is dependent on the melting point of the wax with the higher melting point wax showing less bloom. The amount actually held in solution is probably in the range of less than 1 PHR, for where we depended on the bloom for protection we know this amount of Syncera Wax will give protection.

Question—I am informed that cold GR-S shows better tread wear in the summer in comparison to natural rubber than it does in winter. Is this so and why? I am also advised that the reverse of this is true on truck tires under the same conditions. If so, why?

Answered by Mr. Niemeyer: On passenger tires cold GR-S gives better tread wear than natural rubber in both summer and winter. However, cold GR-S does show relatively greater superiority over natural for tread wear in summer than it does in winter. There is only a slight difference in the rate of tread wear for cold GR-S between summer and winter testing. But with natural rubber the rate of tread wear is significantly less in winter than it is in summer.

I do not agree with the statement on truck tires. The same relation exists for truck tires as stated for passenger tires. In 1949-50, Project BCD on the RFC fleet gave a good picture of relative wear of synthetic and natural rubber on truck tires in summer and winter. In the summer, cold GR-S gave a wear rating 20% better than natural rubber. In the winter, cold GR-S gave a wear rating only 5% better than natural rubber..

Question—In compounding and subsequent tire building what progress has been made with special cements toward improved tire construction with oil-extended polymers?

Answered by Mr. Niemeyer: There has been very definite progress in developing special cements to improve adhesion in building tires with oil-extended polymers. There was some publicity last year on water-base latex type adhesives containing resorcinol-formaldehyde resin. These appeared to give improved uncured adhesion over the conventional natural rubber solvent cements in tire assembly but were difficult to control and maintain adequate cured adhesion. We have found it more satisfactory to stay with the solvent type cements. However, a conventional natural rubber stock solvent cement was not adequate and it was necessary to make improvements in uncured tack by the addition of tackifiers. This overcame the poorer adhesive quality of the oil-extended polymer stock and gave good uncured adhesive strength at room temperature and also at the elevated temperatures encountered in bagging tires. Cured adhesive strength was also satisfactory.

Question—What are the future prospects for oil-extended GR-S?

Answered by Mr. Niemeyer: The future for oil-extended GR-S is definitely bright. It will be difficult to hold back its use because of its economic advantage when you can use a high percentage of 2-3¢/ lb. oil and obtain performance results which are almost equal to 24¢/lb. GR-S polymer. There will be differences of opinion on the relative performance of oil-extended and regular cold GR-S. However, even if the oil-extended polymer is slightly inferior, it will still move forward because of the economic advantage and the increased GR-S plant capacity realized.

Question—What are the future prospects for industry-wide acceptance of large scale production of oil-extended GR-S?

Answered by Mr. Niemeyer: We already have evidence the industry will accept large volume production of oil-extended GR-S. In two years RFC production has grown from zero to 9,000 tons per month. This means approximately 35% of the present gross weight cold rubber production is oil extended. There was some hesitancy to expand its use rapidly since there was some uncertainty as to what the effect of prolonged aging on tires in the field would have on tire performance. It now appears there will be no pronounced deterioration and further expanded use should be forthcoming.

Question—Is there any particular field in which oil-extended GR-S is preferable to regular GR-S?

Answered by Mr. Niemeyer: It would definitely be preferred in second-line tire treads and body plies where its lower cost is important; also in moderate and low cost mechanicals where it will meet specification requirements. It should also be preferred in first-line passenger and small truck tires, except possibly premium tires and the large size passenger tires where greater demands for high speed performance must be met.

Question—This question concerns the compounding of passenger tire carcass compounds. In your opinion, which of the following two methods will produce the better tire from a service standpoint, cost eliminated from consideration: (1) 50% total hydrocarbon from crude natural rubber and 50% whole tire reclaim; (2) 75% total hydrocarbon from GR-S and 25% whole tire reclaim?

Answered by Mr. Niemeyer: While I have no test results on direct comparisons of the two types of compounds presented, it would be my opinion the 75% GR-S with 25% whole tire reclaim would be the better of the two on which to base a passenger carcass compound. We know that at the same reclaim levels as used in natural rubber, 100% GR-S passenger carcass compounds will give entirely adequate service, particularly for the smaller size large volume passenger tires. With this in mind we would certainly prefer GR-S with 25% reclaim over natural rubber with 50% reclaim.

Question—What is the status at present and what are the prospects for GR-S (cold and/or oil enriched) in truck treads?

Answered by Mr. Riehl: Cold GR-S and oil-masterbatch GR-S rubbers can be used under moderate service conditions to give tread performance approaching those of crude rubber. However, under more severe operating conditions, GR-S has been found to be definitely inferior to crude rubber. Admittedly, we will get better wear and less cracking from GR-S treads on the large size truck tires than we did during World War II, but extensive government testing has recently shown that GR-S does not give good tire performance under severe operating conditions.

Question—In general molded goods applications, are there any products in which oil-extended GR-S stocks have not been satisfactory but in which regular GR-S or natural rubber stocks were?

Answered by Mr. Brothers: Oil-extended GR-S polymers have been checked in practically all types of our production and certain compounds are processing equally as well as the regular GR-S or natural rubber compounds. In our opinion the oil-extended GR-S polymers do affect adhesion. They tend to give poorer results as well as less consistent results. Physical properties are similar but tensile usually is around 5 to 10% lower. Knitting or rubber-to-rubber adhesion seems poorer than with the other polymers. We have observed no tendency toward bleeding or staining. Our prime difficulty has been one of handling or processing. The oil-extended GR-S will not take pigment and not pull together as a batch as easily as regular GR-S or natural rubber.

Question—Is oil masterbatching for natural rubber as effective as it is for GR-S? If not, will it present any special problems if oil-masterbatched GR-S is compounded with natural rubber stocks?

Answered by Mr. Riehl: Oil-masterbatch natural rubber has been made by coprecipitating the oil with latex. We have found no advantage in this method over a dry mix. Oil-masterbatch GR-S is made with a high Mooney GR-S that could not be processed without the oil being present. Therefore, there is some question as to whether the oil in an oil-masterbatch GR-S is available for plastication when mixed into a natural rubber stock.

Question—What is the maximum level of oil that can be satisfactorily used in oil-extended GR-S in average molded goods compounds?

Answered by Mr. Reahard: It has been our experience that it is possible to use almost as high oil loading on oil-extended GR-S as it is on regular GR-S. We have successfully written compounds with 50 parts of added oil on the 100 of the oil-extended GR-S. This means that the total oil on the undiluted polymer will run as high as 100 to 120 parts. The reason for being able to use such a high level of oil in an oil-extended GR-S is based on the theory that the oil included in the polymer takes the place of low molecular weight copolymer in regular GR-S and its action is not comparable to an ordinary softener until after an amount has been added equivalent to the amount of low molecular weight material contained in ordinary GR-S.

Question—What technical considerations necessitate the array of GR-S polymers?

Answered by Dr. Palmer: Back in 1952 a formulation for GR-S was adopted so that its properties would be acceptable to the greatest possible number of different types of consumers. Over the years refinements in synthetic rubbers have been made so that now we have a variety of variables to be incorporated in different polymers to achieve various end results. For example, use is made of fatty acid emulsifiers, rosin acid emulsifiers and a mixture of the two; the stabilizer or antioxidant varies from a staining to a semi-staining type or non-staining type; a variety of carbon blacks are used in masterbatches; there are several approved processing or extending oils and these may be used in different amounts. Further, there are variations in the relative amounts of monomers which are reacted. All of these variables lead to the present array of GR-S polymers.

Early last year, RFC eliminated about 40 polymers and there has been a tendency recently for a few new ones to be added. At the present time there are approximately 80 different synthetic rubbers currently in use. It would be to the interest of everyone, cost-wise, to aid in the simplification of this array of polymers, whether they are provided from Government or privately-owned facilities.

Question—What compounding ingredients will give the least stress relaxation in GR-S and in crude rubber? Do you know of literature references on compounding for better stress relaxation properties in GR-S and crude rubber?

Answered by Mr. Brothers: We feel oxidation has a marked effect on stress relaxation, especially at higher temperatures. With GR-S oxidizing less than natural rubber, compounds made from this polymer should give less stress relaxation. Also at elevated temperatures, non-sulfur compounds should exhibit less stress relaxation. Following the same reasoning those practices that give low compression set should give the least stress relaxation. These would be tight curves, low compression set, large particle size carbon blacks such as Thermax and SRF, and a reduction or elimination of pigments that deaden the compounds, like brown substitute. To obtain greater stress relaxation the reverse of these principles should be followed.

In our work we have not been able to obtain too good a separation between stress relaxation and compression set. Braendle and Weigand (*Journal of Applied*

Physics, Vol. 15, pp. 304-08, April 1944) reported that at room temperature and even slightly higher, GR-S relaxes more at low elongation than at higher elongation because of the lower hysteresis of GR-S at the higher elongation. GR-S also relaxes less than natural rubber. Beatty and Juve reported some results on various polymers (*India Rubber World*, Vol. 121, pp. 537-43, February, 1950). They report correlation between their method of measuring stress relaxation is just fair when compared with A.S.T.M. Compression Set, Method B, with, however, the same general trend in rating the compounds tested. Dogadkin and Reznikowskii (*Rubber Chem. & Tech.*, Vol. 24, pp. 99-108 and 810-819, 1951) report that relaxation is the result of a regrouping of structural elements of the molecular chains as accomplished by intermolecular forces and is not primarily a matter of pigment compounding. Mooney, Wolstenholme and Villars (*Journal of Applied Physics*, Vol. 15, pp. 324-37, April, 1944) report a theory attributing relaxation to rupture of secondary chemical bonds and crystal forces with longitudinal slippage of chain molecules.

Question—List the service factors which must be weighed in choosing between GR-S and natural rubber for end-products commonly used in the home.

Answered by Mr. Cook: The factors which must be considered when choosing between GR-S and natural rubber for end-products commonly used in the home should be considered from two angles: (a) the purpose for which the product is to be used and (b) the functional qualities from a manufacturing viewpoint. GR-S should be considered in every case from a material cost basis provided the incurred costs either from the curing angle or from a percent defective do not prove to be higher than if natural rubber were used. GR-S would be the choice where the end-product is exposed to water or heat and where age resistance is necessary. End-products which come in contact with food or which must be more free from odor are improved when natural rubber is used. The improved hot and cold tear resistance of natural rubber is an important factor in many cases both in the end-product and from a manufacturing viewpoint. There is no choice between GR-S or natural rubber when considering color possibilities or resistance to kitchen greases, oils, and cleaning solvents.

Question—Dynamically, can GR-S stocks be made which will be equivalent to natural rubber in resiliency, spring rate and efficiency?

Answered by Mr. Niemeyer: A GR-S stock can be made equivalent to a given rubber stock for resilience and efficiency when dealing with highly pigmented compounds. It is admitted you may have to sacrifice on other physical properties in the GR-S stock. For example, you may reduce pigment loading or use higher concentrations than normal of curing ingredients to obtain increased efficiency and resilience; however, at the same time you may have to accept either poorer tear resistance, lower modulus, lower tensile or poorer resistance to cutting and chipping. The application of the compound involved would have to be analyzed to be sure the resulting GR-S stock would be adequate for performance. If moderately loaded or pure gum stocks are involved it is probable that GR-S could not be made equivalent to rubber since inherently the GR-S polymer is less efficient and resilient than rubber. GR-S can be made to have approximately the same spring rate as natural rubber compounds. However, here again you will have to sacrifice on other physical properties.

Question—Is cold GR-S or natural rubber preferred for compounding mechanical rubber goods with high proportions of reclaimed rubber?

Answered by Mr. Brothers: In mixtures containing high percentages of reclaimed rubber and low percentages of new polymer, natural rubber is preferred. In general, new hydrocarbon is used in these cases to obtain just a little extra quality. When used for these purposes natural rubber seems to have more desirable characteristics than cold GR-S. It has more inherent quality in the gum or unpigmented state. It possesses better processing qualities with less nerve and more building tack. It will also reinforce more in the uncured state and a lower percentage is required in the compound.

Question—Natural rubber has two properties that are difficult to obtain with GR-S: (1) Tack or adhesive properties that are essential on calendered ply stock for ease in tire building; (2) Low hysteresis. What are the prospects for improving GR-S in these two essentials?

Answered by Mr. Riehl: We know of no GR-S type compound that will materially improve the tack or adhesive properties necessary for good tire building and still maintain satisfactory cured properties. If it is not possible or feasible to incorporate 20 or more percent crude rubber as the hydrocarbon, then you must resort to a post calender crude rubber cement. The higher Mooney GR-S rubbers now being produced are coming closer to approaching the low hysteresis found in crude rubber. However, in order to process these rubbers we must resort to the oil masterbatch and it is here that we anticipate producing a practical low hysteresis type GR-S.

Question—Can you give a rough relative rating of cold GR-S and natural rubber with respect to dynamic properties?

Answered by Mr. Reahard: In many respects, the dynamic characteristics of cold GR-S are similar to those of natural rubber. In actual applications it has been found that properly compounded cold GR-S can be substituted for natural rubber in such applications as bumpers or mountings. In other applications where there is an internal working of the part under load, such as shock absorber bushings or Silentbloc mountings, GR-S cannot be substituted 100% for natural rubber. Even in these applications, large percentages of GR-S can be used. It appears that the theoretical limit in this type of application is a 50-50 blend. If the GR-S predominates, the part will fail as quickly as if it had been fabricated entirely from GR-S.

Question—Can GR-S stocks be produced that will have as high dielectric strength as natural rubber stocks?

Answered by Mr. Niemeyer: My answer would be yes. I assume the low water-soluble type of GR-S would be used and moderately high pigment loading would be present. If a lightly loaded or pure gum stock was involved, I would think that natural rubber would have an advantage and it would be difficult to produce a similar GR-S stock with as high a dielectric strength.

Question—Discuss effects of hot milling versus cold milling on GR-S and natural rubber stocks.

Answered by Mr. Cook: In discussing this question, I would like to refer to the work done by Busse and Cunningham on the breakdown of natural rubber. They proved by the different results of breaking down natural rubber in the presence of nitrogen, oxygen and ozonized oxygen that mastication of rubber was an oxidation reaction, and that the greatest effect on plasticity was at temperatures of 300° to 380°F. Their work showed only a mechanical breakdown of natural rubber at milling temperatures of 120° to 180°F. and very little if any breakdown at temperatures of 200° to 280°F. Hot GR-S will follow just about the same curve as natural rubber. However, mechanical breakdown of cold GR-S has little or no effect on the plasticity, and high temperatures actually toughen up this polymer.

Question—Why is non-staining cold GR-S hotter in the Banbury during mixing than is staining cold GR-S?

Answered by Mr. Riehl: Our experience in the processing of non-staining cold GR-S versus staining cold GR-S shows that there is no difference in the temperature of the Banbury during mixing. In this comparison we have used GR-S 1502 versus GR-S 1500. We have also made the comparison of 1502 against X-626 and in each of these instances we find the non-staining GR-S to mix at about the same temperature as the staining GR-S. There is another non-staining cold GR-S available (1503) which uses Polygard as its antioxidant. Polygard does not offer any plastication during the breakdown as do Wingstay and PBNA and it may be that 1503 would tend to run a little hotter during mixing.

Question—Do synthetic detergents, now extensively used in the home laundry, affect natural rubber parts (for example, wringer rolls, gaskets and other washing machine parts) more than those made from GR-S?

Answered by Mr. Reahard: The answer to this question is yes and no. We have run extensive tests on the resistance of various polymers to synthetic detergents. We find that regular GR-S is less resistant to the action of synthetic detergents than a high grade natural rubber. We find that water-resistant grades of GR-S such as GR-S 1007 (or GR-S 65) are more resistant to synthetic detergents than high grade natural rubber. We believe that this effect is proportional to the swelling characteristics of the polymers in water. Mixtures of polymers ordinarily show a resistance between the resistance shown for each of the two polymers being blended. As far as actual resistance to detergents is concerned, there does not seem to be much difference in the various polymers.

Question—Discuss comparative sunlight resistance of GR-S versus natural rubber.

Answered by Mr. Hosier: The subject of the comparative sunlight resistance of GR-S versus natural rubber has so many ramifications as to render any detailed discussion here quite hopeless. While the deleterious effects of sunlight on rubber products have been well known for a long time, it is only in the last few years that we have begun to acquire an appreciation of the very many variables involved. Much of our older data on the subject is of little value because these variables were neglected simply because they were as yet unrecognized. There are several different phenomena resulting from the exposure of elastomers to sunlight, and it is realized that the generalities expressed here in comparing GR-S and natural rubber are subject to many exceptions and contradictions.

Unstretched natural rubber compounds are subject to light-energized oxidation which produces a crazed appearance of a network of fine checks in a resinous or varnish-like layer. GR-S exhibits a similar reaction but the surface layer usually appears to be drier and harder and less continuous in structure. The condition referred to loosely as "frosting", encountered in pure gum and non-black rubber stocks exposed to light, and particularly under conditions of higher than normal humidities, is commonly encountered with natural rubber but is very much less evident in the case of GR-S stocks. Non-black GR-S compounds mold with a smoother and more glossy surface than natural rubber, and retain this surface without clouding or dulling very much longer. This may be partly attributable to the finer particle size of the fillers usually used and partly to the presence of relatively high percentages of para-coumarone resins necessary to obtain good physicals, but seems mainly to be due to the inherent characteristics of the synthetic polymer as compared with the natural.

The cracking of rubber exposed under strain is due to ozone. Early experience indicated that GR-S was inferior to natural rubber in this respect, and this is no doubt true of compounds not specifically compounded for weather resistance. However, when compounds are properly designed for weathering protection, there seems to be little difference between the two polymers. Methods now in use for securing such protection are largely palliative and not too satisfactory.

Question—Discuss types of acceleration for GR-S and natural rubber.

Answered by Mr. Brothers: This particular question could be discussed pro and con for the remainder of the afternoon. In general, the same practice in regard to acceleration is followed with both natural rubber and GR-S. Standard practice calls for a higher percentage of acceleration with a lower percentage of sulfur (on the hydrocarbon) with GR-S than with natural rubber. A greater leeway is allowed for combined sulfur with GR-S. The thiazoles are the prime types used for general purpose compounding with both polymers. Secondary accelerators are also much the same with one notable exception, i.e., the copper-bearing types of secondary accelerators can be used with more safety with GR-S than with natural rubber. By proper combinations

GR-S can be made to cure as fast as natural rubber but a higher percentage of acceleration is required for the same effect.

Our experience has taught us that we cannot use the substituted thiuram sulfides as a prime accelerator in extremely thick pieces. These tend to set up too rapidly and here the difficulty encountered is one of cooling rather than curing. We use slower accelerators in such applications. These are used, however, with both polymers for sulfurless cures. A low percentage of sulfur for vulcanization with tetramethylthiuram disulfide improves tensile strength and elongation in GR-S as in natural rubber. Low sulfur mixes containing selenium give intermediate results, age stiffening being generally least with the low sulfur and selenium and greatest with tetramethylthiuram disulfide. Thiazoles give better results than the thiurams in mixes with the same sulfur ratio.

In general, natural rubber compounds are more susceptible to variations in compounding than are GR-S compounds. It seems that greater variations can be tolerated by GR-S than by natural rubber.

Question—Does Banbury breakdown have much effect on plasticity of GR-S without peptizers?

Answered by Mr. Cook: Banbury breakdown of hot GR-S without peptizers does have an effect on the plasticity of the polymer. Banbury breakdown is more effective in the higher temperature ranges. The plasticity of broken down hot GR-S will hold fairly constant. Banbury breakdown of cold GR-S has little or no effect on its plasticity. Therefore, most of the cold GR-S is used directly without any breakdown.

Question—In high grade hard rubber compounding, does GR-S or natural rubber have the faster rate of cure based on thickness of ½-inch to ¾-inch?

Answered by Mr. Hosier: Of course, with proper acceleration, it is possible to produce GR-S compounds which will vulcanize in the same time as natural rubber. As a matter of fact, we have seen accelerated and loaded GR-S compounds, in relatively thin sections, set up in a mold and hard-cured in open steam which permitted a very rapid rise in steam pressure and a shorter hard cure cycle than corresponding compounds made from natural rubber. However, this question is confined to high grade hard rubber in relatively thick sections. Usually under these requirements, acceleration is held to a minimum to avoid porosity. Furthermore, the exothermic reactions involved in curing thick sections are much more pronounced in GR-S than in natural rubber, and in order to prevent porosity it is advisable to employ lower curing temperatures. The net result is, that, from a practical standpoint, GR-S must be considered as slower curing than natural rubber under these specific conditions.

Question—Does the degree of plasticization of GR-S or natural rubber affect the ability of either to carry physicals in hard rubber? If so, which is better?

Answered by Mr. Hosier: Normal variations in the plasticization of either GR-S or natural rubber apparently have no appreciable effect on the rate of vulcanization or the ability of either to carry physicals in hard rubber. Abnormal mastication of crude (say a couple of hours) does result in some reduction of physicals, and excessive mastication after compounding is more harmful than on natural rubber alone. Over-milling of GR-S in most any type of compounding does not reduce cured physicals nearly as much as with natural rubber and in the case of hard rubber, the effect is practically nil. In either case such extreme mastication is unlikely to be encountered and the effect of mastication on the physicals may be disregarded. A word of caution should probably be inserted on the use of oils and softeners. They are often used in small amounts as processing aids, but in large quantities they may seriously affect physicals. There are no general rules; different softeners affect different physical properties, and there seems to be little or no correlation between GR-S and natural rubber as to the resultant effects.

Question—Which makes better lasting road surfaces when mixed with asphalt—GR-S or natural rubber?

Answered by Mr. Riehl: Considerable work is being done in an attempt to answer this question. At the present time it is not possible to give a definitive answer on the basis of results to date. We believe that in the long run, GR-S will have certain advantages, particularly in that it can be custom made for the job required of it and eventually make GR-S a better material to mix with asphalt than natural rubber. Furthermore, GR-S is less expensive, which is quite a factor in this problem.

Question—Can a light-colored GR-S stock be compounded of about 65 durometer that will compare with a natural rubber light-colored stock of 65 durometer for bonding to steel?

Answered by Mr. Brothers: Light-colored 65 durometer GR-S stocks can be bonded to steel as readily as light-colored natural rubber stocks. However, when the adhesion is checked, it should always be better than the rupture strength of the compound itself. It is recognized that light-colored stocks can be produced to higher quality using natural rubber than with GR-S and it would follow that higher quality adhesion stocks can be obtained in light-colored natural rubber compounds.

Question—In the manufacture of gloves, balloons, and similar dipped goods, is there any type of GR-S that could be used competitively quality-wise with natural rubber?

Answered by Mr. Hosier: The phrase "competitively quality-wise" makes the answer to this one definitely "No." The relatively poor film-forming characteristics and the extremely low pure gum physicals make GR-S latices quite unsuitable for high quality dipped goods. In a competitively priced glove with no serious demands for quality it is possible to blend small percentages of GR-S latex, but the quality very definitely suffers. Replacement of 25% of the natural rubber in a latex compound by GR-S lowers the tensiles by as much as 50%. Such replacements using cold latices produce decreases in physicals of a somewhat lower

order, but reproduction of consistent results is difficult due to a lack of uniformity in the synthetic latices. The cold types point the way toward possible improvement but are still a long way from Hevea.

Question—Explain the relative behavior of GR-S and natural rubber under conditions of high temperature and long aging.

Answered by Mr. Brothers: We normally interpret this behavior of both GR-S and crude rubber as one of oxygen adsorption. The rate of oxygen adsorption will increase as the temperature is increased. Cross-linking of the polymer appears more rapid with the GR-S polymer than with natural rubber when exposed to heat aging. When GR-S is oxidized at high temperature over a long period of time the oxidation will reflect itself both in a loss of strength as well as in an increased stiffness of the compound. We suspect that this stiffness can be caused by the oxygen bridging or cross-linking.

Dependent upon time and temperature the reverse can also be observed where an increase in oxygen concentration can cause a softening action rather than a stiffening action. Natural rubber seems to move in the direction of softening when exposed to high temperature over a period of time. The tighter the cure for the GR-S the less susceptible it is to the softening reaction. GR-S vulcanizates seem to reach a constant strength value but do become stiffer and less extensible. In hot service conditions the GR-S will tend to fail due to its inability to stretch rather than through loss in strength.

Our experience indicates that GR-S compounds will resist these higher temperatures and longer aging periods better than natural rubber and we are inclined to believe that current reclaiming techniques tend to prove this out. Results from our laboratory show that GR-S exposed to 7 days at 158°F. aging will show a maximum loss in the range of 2% when judged by tensile strength. Those results will vary from the maximum loss of 2% to a positive increase in strength depending upon state of cure. When these same compounds are exposed to 212°F. for four days they will lose tensile strength in the range of 10 to 12%. Under identical test conditions, natural rubber compounds will lose in the range of 10 to 15% in tensile when exposed for the seven day test at 158°F. When exposed to 212°F. for four days the loss in tensile can be as much as 80%.

Lockfoam—A Multi-Purpose Liquid Plastic

THE development of a multi-purpose liquid plastic, already being used in aircraft as a structural stiffener and which is said to offer new opportunities to the construction and other industries in soundproofing and insulation, was recently announced by the Lockheed Aircraft Corporation of Burbank, Calif. Both the American Latex Products Co. and the Nopco Chemical Co. have been licensed to manufacture the new material.

Called Lockfoam, the material is a foam plastic, which changes from liquid to solid in use. In its liquid state, it can be poured in place, sucked into cavities through holes too small for pouring, or flowed into casting blocks for carving to size. From a liquid, it expands to fill the structural cavity into which it is poured. It has already provided Lockheed with the answer to the problem of how to give strength and stability to small and often odd-shaped aircraft structural cavities.

Exceptionally tough for its weight, which can be varied from 1½ to 35 pounds per cubic foot, Lockfoam is moisture resistant, casts easily to any shape, and adheres itself to enclosing structures. At the present time radomes on the nose of Lockheed's 600 m.p.h. F-94C Starfire jet interceptors are built with Lockfoam as the radome core, sandwiched between glass fiber skins. In addition to passing radar waves without interference, Lockfoam is reported to provide excellent insulation against shock, sound, heat, cold, vibration and electricity.

Other utilization of Lockfoam includes: filler for F-94 ailerons, rudders, elevators, wing trim tabs and rocket exit doors; additional strengthening of shock absorbing structures in P2V wings; P2V antenna housings; and for insulation in the cabin ventilating system of the Super Constellation.

By varying the materials in the chemical mixture it is possible to produce Lockfoam for specific purposes, from rigid forms capable of withstanding hundreds of pounds pressure per square inch to others as flexible as sponge rubber. The foaming liquid substance can be poured and set under ordinary room conditions, without heat or special equipment. During foaming it sticks naturally and strongly, without glue, to wood, paper, fabrics, metals and glass fiber.

One example of Lockfoam's versatility, company research engineers reported, involved a conventionally made radar antenna mast which was failing from fatigue. This problem was solved by simply filling the cavity with foamed-in-place Lockfoam. No redesign was required and consequently no production shortage occurred.

Lockfoam's adaptability for pouring into a larger cavity, such as the F-94 aileron, was extensively tested. Several full-scale, Lockfoamed ailerons were subjected to outdoor weathering. A recent check on one of them showed no adverse effects after a two-year exposure. The bond between the skin and foam remained excellent and a deliberate fungus test produced completely negative results. The completion of the aileron program proved that the foam could be expanded successfully in an irregular-shaped cavity of large size.

Cellulose: The Chemical That Grows. By Williams Haynes. Published by Doubleday & Co., Inc., Garden City, N. Y. 5½ x 8¼ in. 386 pp. $4.00.

This book relates the story of the cellulose industry from the age of Marco Polo to the present, and since it is written in the free-flowing style for which the author has become noted, it is far more than a mere recording of fact and legend. The paradoxical and complex qualities of this useful chemical are traced through 16 chapters, each liberally sprinkled with anecdotes directly or indirectly related to specific developments. Brief references to the paths crossed by cellulose and rubber are sprinkled throughout the book. Adding to the value of the book is the inclusion of a concise glossary, a chronology of events and discoveries, and appendices of statistical and technical data. The book, incidentally, is the first in a new American Industry Series launched by the publishers.

Vulcollan—The New Polyester Rubber

By FREDERIC POPPER

Although considerable interest has been aroused in recent months with regard to the polyester rubber developed and marketed in Germany under the trade-name of "Vulcollan," very little information on the new polymer has appeared in the literature. Interest in this material was heightened in recent weeks with the announcement by the Goodyear Tire & Rubber Co. that it had secured patents on a new polymer process similar to the German Vulcollan. Because of the potential development of these new polymers, we commissioned Dr. Popper, formerly editor of the German-language "Gummi und Asbest-Zeitung," to prepare the following data on the German material.—EDITOR.

A DIVISION of the former I. G. Farbenindustrie organization in Germany is again gathering laurels in the field of synthetic elastic polymers. Those familiar with this field will recall that this organization demonstrated the first practical synthetic rubber during World War I by the sodium polymerization of dimethyl butadiene. Later work brought forward the emulsion polymerization of buna rubber from which our present GR-S was developed. Even the cold rubber polymerization process was first reduced to practice in the very laboratories of Bayer in Leverkusen where apparently a new man-made rubber is making its appearance, i.e., Vulcollan.

Technical Background

Any product of the type under discussion is naturally not created in a day and the cooperation of many qualified brains have to be coordinated to bring forth a product having properties that will make it desirable for use. From the pertinent literature (*1-4*) it appears that development work on the present Vulcollan started about 1937 with the examination of polyesters and polyurethanes. Both now play an important part in the plastics and synthetic fiber industries and will not be further discussed here.

In 1940, Messrs. E. Christ and E. Hanford of the DuPont organization observed that polyester combined with tri-thioisocyanate gave an elastic product. About the same time Dr. Schack of the Farben group also observed elastic properties in the reaction product of polyester and di-isocyanate. It is definite that H. Pinten of the Farben group in 1942 was the first to investigate the polyester and di-isocyanate reaction. He found that valuable elastic materials are produced only in a narrow range of composition, and the result of his work was the development of the so-called "I-Gummi." It was prepared by the condensation of adipic acid with glycol and some glycerine. This polyester was then reacted with hexamethylene di-isocyanate. The finished product —I-(socyanate) Gummi—showed remarkable abrasion resistance, tensile and elasticity, but also displayed very poor high and low temperature stability.

Shortly thereafter, Otto von Bayer, director of the scientific laboratories of I. G. Farbenindustrie at Leverkusen; now known as Farbenwerke Bayer, Leverkusen, who had previously worked on the polyurethanes, together with a group of collaborators, began to investigate Pinten's discovery more thoroughly. This investigation is apparently still going on. The described properties of the products already available on the "German" market are of such nature that they have stimulated the intense interest of the American rubber industry.

Preparation of the Polymer

The information available permits a subdivision of the preparation process into three stages:

A—Preparation of the linear polyester.

B—Branching of the polyester with di-isocyanate.

C—Final branching (curing) by adding either water, glycol, diamine or additional isocyanate.

There are certain variations of chemicals and preparation methods already described and undoubtedly others are possible, mostly with the result of a variation in properties. For more details on these the literature may be consulted. The principles, methods and properties in general only are given here.

The Polyester: Polyesters are condensation products of dialcohols with dicarbonic acids (see Figure 1). Preferentially mentioned are the polyesters prepared from ethylene glycol with adipic acid and 1,2 propylene glycol with adipic acid. While the former appears to harden prematurely, the latter is said to be free of this deficiency. A mixture of both with at least 30% of the propylene glycol is said to show safer storage and cold stability. Other functional groups can be built into the polyester, such as diamines, aminoalcohols and glycerine. The specific requirements of the finished polyester demand that a surplus of the glycol be used over the adipic acid on a molecular basis, so that the acid number is as low as possible and the amount of OH groups does not vary much from 1.5%. This is the case when about 13 molecules of adipic acid are combined with 14 molecules of glycol. The average molecular weight is then between 2000 and 2500.

The polyester is prepared by melting together the two or more components and increasing the temperature from 160 to 220° C. to remove the water that is formed within 20 to 40 hours and finishing the removal of water by applying a vacuum under further heating.

Glycol + Adipic Acid → Polyester + Water

$$HO(CH_2)_nOH + HOOC(CH_2)_4COOH \rightarrow \ldots O(CH_2)_nOOC(CH_2)_4COO\ldots + H_2O$$

FIG. 1—Preparation of polyester from glycol and adipic acid.

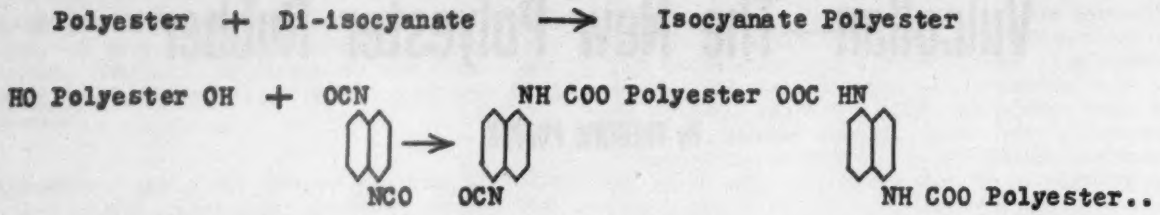


FIG. 2—Branching of the polyester with di-isocyanate.

The two glycols mentioned are the same chemicals which are used as permanent anti-freeze in cars. There are so many other uses for glycols that the demand appears to be always slightly bigger than the supply. They are prepared in this country from the vast resources of natural gas and any future increased demand can be satisfied.

Adipic acid is also available on the market, though its supply is judged to be limited (*5*). It is one of the main ingredients for the preparation of nylon. Most of the adipic acid is prepared from phenol which is hydrogenated to cyclohexanol and in turn is oxidized to adipic acid.

Branching of the Polyester with Di-isocyanate: Di-isocyanates are also difunctional chemicals. The isocyanate groups are extremely reactive and are used here to interconnect the individual linear polyester molecules (see Figure 2). Preferentially mentioned are the aromatic di-isocyanates, such as 1,5 naphthalene di-isocyanate. They are best prepared by the phosgenation of the corresponding diamine salts. The aromatic diamines themselves are prepared over several stages and their supply is rather limited. Phosgene is a readily available industrial raw material. The preparation and handling of the di-isocyanate from the diamine and the phosgene has to be done under the most careful conditions and demands a better than average skill and supervision. The di-isocyanate is the most expensive portion in the finished elastomer.

The amount of di-isocyanate used depends on the residual acid and the number of OH groups left in the polyester. Two methods for adding the di-isocyanate are used. Both methods use about a 30% surplus over the equimolar amount of the available OH groups in the polyester used and which may amount to around 16%. The two methods are:

(a) All the di-isocyanate is added at once: The carefully dewatered polyester is heated to 130° C., the di-isocyanate is added and after a few minutes the reaction is finished. During this reaction the liquid molten polyester becomes more viscous. This molten polymer has to be very carefully protected from moisture and is thus stable for a few hours. Its further processing will be discussed later.

(b) Less than the equivalent di-isocyanate is added first: To the dewatered polyester slightly less than the equivalent amount of di-isocyanate is added based on the OH groups in the polyester. The reaction is also made at around 130° C. and is again terminated within a few minutes. Further heating at this temperature transforms the reaction product into one resembling crude rubber. This polymer is said to have safe moisture and storage stability (in contrast to that described directly above). The further processing of this polymer will also be discussed later.

Final Branching (Curing): The isocyanate groups in the polyester prepared according to the method described in which all of the di-isocyanate is added at once are still very reactive, and accordingly final branching (curing) is required. As previously outlined, this can be accomplished with water, glycol, diamine or additional di-isocyanate. The chemical structure of an isocyanate polyester after the addition of water is shown in Figure 3. Discussion of the four methods follows, with the reactions of the isocyanate polyester shown:

ADDITION OF WATER

$$2R\ NCO + H_2O \rightarrow R\ NH\ CO\ NH\ R + CO_2$$

The addition of water was the first method used. The isocyanate polyester and water first forms a urea derivative which reacts with the yet unreacted isocyanate polyester, thus forming a large molecular network. This reaction with water also produces carbon dioxide which can be utilized in preparing a foamed polymer. The small amount of water necessary may be added by exposing the polymer to humid air, blowing steam into the molten polymer, or adding some water-producing chemical. If a non-porous polymer is desired, the reacted polymer has to be milled, molded and cured within a rather short period.

ADDITION OF GLYCOL

$$2R\ NCO + HO(CH_2)_nOH \rightarrow R\ NH\ COO(CH_2)_nOOC\ NH\ R$$

By adding a glycol-type chemical to the molten liquid polymer a large-sized molecule is also formed. There is also a change in chemical composition, as will be noted from the reaction above. No carbon dioxide is developed in this instance, and the isocyanate polyester is now connected over urethane bridges.

ADDITION OF DIAMINES

$$2R\ NCO + H_2N(CH_2)_nNH_2 \rightarrow R\ NH\ CO\ NH\ (CH_2)_n\ NH\ CO\ NH\ R$$

Addition of a diamine-type chemical to the freshly prepared isocyanate polyester forms double urea bridges in the finished molecule. The advantages of not using water for this step lies in the fact that by the choice of a suitable glycol or diamine the fast increase into a giant solid molecule can be better controlled. This factor is quite important for the further processing into the finished product. In order to obtain optimum properties the amount of glycol or diamine added should be just less than the equivalent reactable isocyanate present. At all events the use of glycol or diamine for this step permits the use of a liquid polymer which may be cured without pressure.

ADDITION OF DI-ISOCYANATE

The product secured when less than the equivalent di-isocyanate is added first (as described above), which resembles crude rubber, is processed on conventional rubber equipment. Further di-isocyanate is added to the polymer on the mill so that the total amount in the

polymer corresponds to that which is utilized when all of the di-isocyanate is added at once (also as described above).

Production Costs

According to reliable reports, the German Vulcollan is being sold in the neighborhood of $2.00 per pound. Even with the information available, it is naturally very difficult to even guess the cost of the product. German figures can be used as a guide only, because raw material and manufacturing costs in this country are much different.

The most important factor in eventually reducing the price of the polyester rubbers will be the size of production. An optimistic estimate may be in the range of $1.00 to $2.00 per pound after production reaches fairly large quantities. However, it is interesting to note that the foamed polymer is already competing with natural rubber foams in several European countries.

Depending naturally on the ingredients used and other variations possible, the chemicals in the following table are used in the approximate extent shown, the cost of the raw materials being included to give some idea of some of the over-all production costs:

Chemical	Parts by Weight	¢/lb.
Glycol	34	18
Adipic Acid	67	31
1,5 Naphthyl di-isocyanate	15	$4-$5
Total	116	
Loss in reaction	16	
Total parts of polymer	100	

It has already been established that this new type of rubber can be compounded with pigments and fibers, and such compounding contributes to a reduction in volume costs. It is not yet known, however, whether this can be accomplished with any of the conventional reinforcing pigments, nor how the properties of the final polymer will be affected by the use of such pigments.

Properties of the Polymer

What are the properties that make this new elastic polymer more attractive than the now conventional elastic natural and man-made materials? Most important are high abrasion resistance, oxidation and aging stability, non-swelling in oil and benzene, high tear resistance, good elasticity and, under certain conditions, processing.

The high abrasion resistance was first observed on the "I-Gummi" samples made by Pinten. Later preparations made into heels showed a wear superior to that of the high styrene copolymers. The high abrasion and tear resistance is utilized in friction drives and in solid wheels for carts used under severe conditions as in steel mills or machine shops. The non-swelling property finds application in the mechanical goods used in refineries and in the chemical industry. The high aging resistance is due to the absence of unsaturated bonds in the polymer, a property in which both natural rubber and GR-S are deficient. This property of the Vulcollan-type polymers may eventually be put to good use in tire sidewalls, and certainly is a recommendation for wide application in foams and sponges. The possibility of processing and curing the liquid polymer in molds without pressure can also be considered among the desirable features.

These favorable properties make it understandable why one leading American tire manufacturer is already

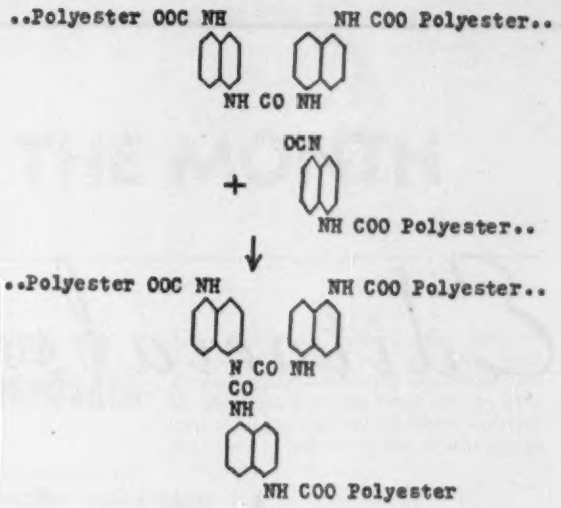


FIG. 3—Isocyanate polyester after the addition of water.

experimenting with the application of a polyester rubber in tire tread stocks (*6*). Those familiar with the properties of elastic materials, however, know that increases in certain properties are often, if not always, offset by decreases in certain other properties. The question therefore arises as to what are the failings of the new material.

The difficulties in producing and handling the polymer after the di-isocyanate is added have already been stressed. Judging from the chemical composition of the polymer it can be foreseen that at this stage of the development general applications will be limited by these four characteristics: (1) Poor low temperature stability; (2) Poor high temperature stability; (3) Poor stability against water, alkalis and acids, especially at elevated temperatures; (4) Lack of building tack and poor compounding properties.

The future will undoubtedly show how the advantages in properties of the polyester rubbers can be balanced against present disadvantages and higher cost as compared with other elastomers. Based on the positions earned by other polymers, such as GR-I and the nitrile rubbers, the polyester rubbers will find specific applications, dependent on demonstrated combined properties.

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Mission Manufacturing Co., Houston, Texas, has introduced a new solid plastic centrifugal pump made of a composition containing a phenol-formaldehyde resin or furfuryl alcohol resin and an inert filler of asbestos or graphite. The new pump, which features a solid plastic concentric casing with solid plastic semi-open impeller, is designed for handling acids, bases, salts, and many solvents and other chemicals.

Editorials . . . . . .

Unrecovered Cost Factor

AS pointed out on this page last month, the recent recommendations made by the Reconstruction Finance Corporation to the President and Congress on the disposal to private industry of the government-owned synthetic rubber production facilities indicated that the original cost of the 29 plants involved amounted to approximately $500,000,000 and that their current book value is $172,600,000. Also as stated, the RFC report expressed no opinion as to the true economic value of these facilities, although a figure of $350,000,000 has been advanced by Representative Paul W. Shafer, who authored the present Rubber Act, and generally accepted by industry.

Although no specific method for determining the price of the synthetic rubber facilities is contained in the RFC report, the report does suggest that the viewpoint that the price to be realized by the government should not exceed the amount reflected on the RFC books, after provision for depreciation, be rejected. This formula of price determination has been advanced in the past, particularly during the course of Congressional hearings. The argument for valuing the plants by reference to book cost, which is contrary to accounting practices, is, according to the RFC report, "premised upon the notion that the government has already recovered, out of the sale of rubber, that portion of the original cost of the facilities now reflected in the reserve for depreciation."

According to RFC, the point must be recognized that the nation at large has built and paid for the synthetic rubber facilities and, upon disposal, is entitled to realize their full value. The sale of the facilities, therefore, at their recorded cost on the government's books would constitute "a subsidy or gift from the American people to those few who acquire the plants." It is at this point in the RFC report that a slight clue is given with regard to the feeling of RFC officials as to the over-all value of the plants from the standpoint of original conception, construction and operation. This clue is given in a footnote in the report devoted to "unrecovered costs."

The footnote in question indicates that the unrecovered cost of the synthetic rubber facilities is not represented by their net carrying value. The net book value of the existing capital facilities at the end of 1952, as previously stated, is shown at $172,600,000, after depreciation in the amount of $351,900,000. It is pointed out, however, that prior to June 30, 1946, while the synthetic rubber facilities were being operated as a wartime emergency project, rubber was not sold at a price sufficient to cover operating cost, and this resulted in a net operating loss from inception of the program through June 30, 1946, of $211,800,000. From June 30, 1946, through December 31, 1952, a profit of $12,100,000 was shown, resulting in a net operating deficit of $199,700,000 from inception through the end of 1952. The operating results are after deductions of all operating costs including operating and stand-by depreciation in the respective amounts of $399,500,000 and $68,000,000.

The synthetic rubber program sustained a further loss, the footnote states, following the wartime emergency upon the disposal of some of the facilities (particularly styrene plants), this loss plus other non-operating losses totaling $74,100,000. Accordingly, in order to arrive at the unrecovered investment of the American people in the synthetic rubber facilities the total of the operating deficit plus the loss on plant disposal and other recorded losses to date plus the net book value of the remaining facilities must be considered. This method of figuring indicates that the unrecovered cost to the American people of the synthetic rubber facilities as of December 31, 1952, amounts to $446,400,000.

It could be argued, as pointed out by the Natural Rubber Bureau in the current issue of "Natural Rubber News," that some of these "unrecovered costs" could be reduced by an immediate increase in the present 23c per pound price of GR-S with the higher price to be maintained during the transition period before the facilities are turned over to private industry. It could also be argued that the figures themselves are open to argument from an accounting standpoint. In any event, it is our guess that Rep. Shafer's estimate of $350,000,000 will come close to the target.

NEWS OF THE MONTH

SYNTHETIC PLANT DISPOSAL PLAN DELAYED TO PERMIT ADMINISTRATION TO REVIEW PROPOSALS

THE Senate, on March 31, passed and sent to the House of Representatives a bill allowing President Eisenhower 30 more days to write a plan for the disposal of the government-owned synthetic rubber plants. Previously, the President was required to submit a disposal plan by April 15. The new bill, moving the date to May 15, was not expected to meet any opposition in the House, although there had been some earlier argument. The Treasury Department had originally requested a 90-day delay to permit it to prepare a study for the White House. This request caused an immediate reaction from Congress and industry officials who want speedy disposal of the synthetic plants. Senator Capehart (Rep., Ind.), who originally introduced the 90-day delay measure, was persuaded to compromise the bill and the 30-90-day delay proposal was reported out by the Senate Banking and Currency Committee, of which Senator Capehart is chairman.

Representative Paul W. Shafer (Rep., Mich.), chairman of the House Armed Services Subcommittee, said that while he will not oppose the 30-day delay measure, he didn't particularly like it. The 30-day delay, he said, can't do any harm, since the subcommittee can't do much before May 15, anyway. He noted that many rubber company officials plan to attend the meeting of the International Rubber Study Group in Copenhagen in May.

Because of the rubber conference, there was some speculation that the 30-day delay may not be necessary after all. The White House may formulate its plans early, so that American representatives can take them along to Copenhagen. If the Administration does wait until May 15, when the Copenhagen conference is over, a partial vacuum may surround that meeting.

RFC Purchases Alcohol

As Congress and industry pondered disposal problems, the synthetic industry itself was dealing with day-to-day production problems. On March 31, the Reconstruction Finance Corporation announced that it had purchased 16,400,000 gallons of alcohol for use in the production of butadiene. The suppliers, who were the low bidders, are Harris & Purdy Co., Inc., and Publicker Industries, Inc., both of Philadelphia. Of the quantity purchased, 10,000,000 gallons were domestically produced and 6,400,000 gallons were of West German origin. RFC was reported to have received offers from French producers, and this was said to have caused some disturbance among American producers. It was pointed out that French alcohol producers enjoy a 12.5% export subsidy from the French government and that American producers need the RFC business to avert plant shutdowns here.

Announces New Process

Other news came from the Copolymer Corp. of Baton Rouge, La., which announced a "steam jet" process of mixing carbon black into rubber in its liquid state. This process, according to company officials, results in a tougher rubber than any yet produced, at a reduction in both initial and processing costs.

The Copolymer announcement said that tires made of the "steam jet" cold GR-S have been given grueling road tests by the government's test fleet in Texas. Preliminary findings, after 18,000 miles of around-the-clock driving, show a 20% improvement in tread wear over control tires of the best cold GR-S produced by other methods. Copolymer also said that rubber made by the new process eliminates the use of detergent-like wetting agents necessary in present black masterbatch production, thus cutting production costs.

In a memorandum dated March 11, RFC announced that in previous weeks it had received numerous letters from consumers of cold black and cold oil-black masterbatch polymers indicating their acceptance of Kosmos 60 on an interchangeable basis with the other HAF blacks currently used in the synthetic rubber program, namely, Philblack O, Aromex, Vulcan 3, Continex and Statex R. Kosmos 60 is produced by the United Carbon Co.

Inasmuch as this black meets specifications set down by the Office of Synthetic Rubber, Kosmos 60 is being included in its line on an interchangeable basis. Henceforth, OSR will refer to this black as Kosmos 60-I. Each bale of carbon black masterbatch incorporating the black will be identified with the letter "I" to indicate not only the type of black, but also the plant in which it was manufactured (Ivanhoe).

Natural Rubber News

News of natural rubber came first from the National Production Authority which, on March 26, modified one of the last restrictions on the use of natural rubber. It dropped a restriction from Order M-2 which limited the use and consumption of I-X and I pale crepe rubber in making shoes, shoe soles, heels, welting and wrapping.

The only usage restriction retained in the order is that banning the use of pale crepe in the manufacture of pneumatic tires. NPA said this is being restricted because of the heavy tonnage involved. Requirements of pale crepe grades for the national strategic stockpile, NPA said, are completely covered by contracts and the present supply is in close enough balance to permit the relaxation.

It was also reported that the Government of Burma has put the export of rubber under control. Licenses will be required for the export of any rubber from that country. The order, promulgated on April 1, came within a week after the export of 1,500 tons of rubber to Red China through a private agency on a Polish freighter.

Shipments to Red Bloc

Rubber shipments to Red bloc nations have been evoking comment from many governmental sources. One of the aspects of the recent negotiations between the Senate Investigations Subcommittee, headed by Senator Joseph McCarthy (Rep., Wisc.), and a group of Greek shipowners, led to questions involving shipments of rubber by Great Britain to Communist China ports.

Frank C. Nash, Assistant Secretary of Defense for International Affairs, in testimony before the subcommittee, pointed out that fellow members of the United States in the North Atlantic Treaty Organization (NATO) have passed laws to cut down shipments of materials that could aid the enemy in Korea. He said that with this country leading the movement to cut off shipping that helps the enemy, laws enacted by Congress were not wholly adequate.

However, he also noted that in certain instances the laws were overly stringent

and might cause dilemmas involving most important allies. A case in point, Mr. Nash said, was the continuing and apparently increasing shipment by Britain of rubber to Red China. Although rubber is viewed by the Defense Department as distinctly a strategic material, it is not on the prohibited list of American law.

With rubber shipments such a major factor in British economy, he said, a ban on them might prompt a violation of the Battle Act of 1951 that would automatically cut off Great Britain from all Mutual Security aid, although that country is perhaps our number one ally. Mr. Nash said this was an example of the delicate approaches that have been necessary in curtailing or stopping currents of world-wide sea commerce.

Harold E. Stassen, Mutual Security Administrator, also revealed before a Senate subcommittee that the United States was trying to persuade Ceylon to cancel the rubber-for-rice agreement which that country recently concluded with Red China.

Ceylon Answers Harriman

In the February issue of RUBBER AGE, there appeared a report on the farewell address to Congress by W. Averell Harriman, retiring Mutual Security Administrator, in which he expressed concern over a deal made by the government of Ceylon to ship 250,000 tons of natural rubber to Red China during the next five years. The Ceylonese government has now issued a statement in clarification of its views.

The Ceylonese statement points out that Mr. Harriman's remarks received wide publicity in many countries and was aware that his version was apt to be accepted as factually correct. Ceylon, however, decided to make no official comment, at that time, on a statement by an official of the administration. The Ceylonese statement declares that the present time is opportune to place before the public the circumstances that were responsible for the failure of the negotiations between the United States and that country, and the considerations which led to the eventual agreement between Ceylon and China. The Ceylonese statement says in part:

The story of the attempts to secure international control of rubber, which were, in the main, initiated by the United States, goes back to the London conference of February, 1950, at which Ceylon was represented. The conference was doomed to failure because it was obvious from the start that consumers were anxious to secure all the rubber they could at their own price and without regard to the interests of producers. A perfectly reasonable request by producers for an international rubber agreement on the lines of the International Wheat Agreement was rejected by consumers.

It was, however, agreed tha tthe conference should adjourn and meet in Rome in April the following year. Meanwhile, the United Kingdom, apparently with the consent of, if not actually at the request of, the United States imposed a ban on the movement of rubber from Malaya to Communist countries. The Government of Ceylon made representations against the likely adverse effect of such a step on the world rubber market and, while expressing disinclination to trade with Communist countries, emphasized the need for reasonable assurance of protection of rubber interests as a pre-condition for the imposition of any destinational control. When the rubber conference met in Rome in April, 1951, the consumers already had the advantage of this destinational control with its repercussions of a depression price, and the conference failed again for lack of agreement between producers and consumers on fundamental issues.

The United States successfully introduced in the United Nations a resolution which was adopted in May, 1951, imposing a ban on the export of strategic materials which included rubber to China and North Korea. This was followed a month later by the so-called Kem Amendment legislation of the United States which provided that countries contravening the United Nations resolution would forfeit United States economic aid except in those cases in which individual countries applied for and received from the United States special exemption from the application of the Kem Amendment.

Almost at the same time, i.e., in June, 1951, the United States Government made a proposal to the Government of Ceylon for the bulk purchase of Ceylon rubber. The Government of Ceylon welcomed this proposal, and negotiations proceeded. The main obstacle in the way of an agreement was the price, the United States offering the average Singapore price for Ceylon rubber while the Government of Ceylon considered that the appropriate price should be that prevailing in the Colombo market. Negotiations eventually came to an end on the United States declining to proceed further.

Despite this insistence on the part of the United States that Ceylon should sell her rubber at the Singapore market price, an agreement between the United States and Thailand was reported in the same month in which the United States agreed to buy Thailand rubber "at the price which prevails at the time of offer in the world market." This inconsistency in the attitude of the United States became more inexplicable in the light of later negotiations with Ceylon.

On September 10th, 1951, Ceylon stated a case to the United States for special exemption from the operation of the Kem Amendment for the export of Ceylon rubber. This was done more to clarify Ceylon's position in her opposition to destinational control of rubber, than to avoid forfeiture of United States aid, because, in fact, Ceylon had received no aid to speak of from the United States although an agreement was signed in November, 1950, between the two governments for the provision of technical aid to Ceylon under the United States Point Four Program.

Is Opposed to Communism

The Government of Ceylon does not deem it necessary to accept or repudiate blame for failure of Ceylon-United States negotiations on rubber to materialize in an agreement, or to make any plea for the eventual agreement concluded with the Chinese Government. It is necessary, however, to say in retrospect, that while the Government of Ceylon remains, and will continue to be, opposed to Communism, its doctrine, and its method, it considers it the primary and most important duty of any government to safeguard the economic well-being of its people.

The Government of Ceylon has shared and will always share the aspirations of the Western democratic world in the preservation of democratic institutions, and the democratic way of life, but it does not consider that mere formulation of political slogans and political doctrines can replace the sincere purpose and a genuine will to cooperate internationally. In the present context while the Government of Ceylon is in complete sympathy with the democratic world in its opposition to Communism, it cannot be a party to any policy which sacrifices economic well-being for political expediency and so is apt to produce just those undesirable consequences which are sought to be avoided or eliminated.

OPS Ends All Controls

All remaining price controls were lifted by the government on March 17. In Amendment 1 to General Overriding Regulation 44, the Office of Price Stabilization exempted from price control all sales of all commodities and services. Before the March 17th action, sulfur and sulfuric acid were still under controls.

Atomic Rubber Trees

To help the U. S. save millions of dollars Argonne National Laboratory is growing a miniature rubber plantation in Chicago, Ill. The trees, planted last Fall in greenhouses, are to be made radioactive. Rubber made from their sap is expected to provide a valuable research tool for the following goals. (1) How to prevent oxidation and ruin of stock-piled rubber which runs into millions of dollars loss every year; (2) Learn how the rubber tree makes its rubber. This might enable scientists to improve present synthetic rubbers; (3) Provide material for industrial research on how rubber wears under friction. The radioactive rubber contains atoms of Carbon 14, an isotope created in the atomic piles at Oak Ridge. The isotope, minute quantities of which can be traced in various chemical compounds, will provide the key for the better understanding of what the plant does to form rubber. Work of growing the rubber trees in sealed greenhouses containing a "radioactive" atmosphere is under direction of Dr. Norbert Scully, Argonne's senior plant physiologist and his associate, Dr. John Skok. The project is but one of many which are expected to prove useful to mankind, said Dr. Scully.

ASTM COMMITTEE E-1 HOLDS INTERESTING DETROIT MEETING

Committee E-1 on Methods of Testing, American Society for Testing Materials, held a very interesting meeting in Detroit, Mich., recently, in conjunction with ASTM Committee Week. It was reported that for several years there has been a need expressed by both industry and government for the standardization of performance specifications for high-humidity enclosures for testing purposes. Several such enclosures have been developed for specific applications, particularly in standards issued by the various government agencies.

The Subcommittee on Conditioning and Weathering, A. C. Webber, chairman, of Committee E-1, at its meeting in Detroit on March 3, prepared a list of essential requirements for such enclosures for high humidity testing. These proposed requirements will be referred to a task group for use in preparing a proposed standard. The subcommittee also decided to prepare general methods of determining relative humidity since the need for a more up-to-date method than the present ASTM Standards D377 has been indicated.

A comprehensive report covering a survey of the testing of elastomers for stiffness at low temperatures was presented by a task group under F. M. Gavan (Armstrong Cork) at the meeting of the Task Group on Low-Temperature Testing of Elastomers and Plastics, R. S. Havenhill, chairman. This final and rather extensive report contains results obtained in a round-robin testing program on stiffness at low temperatures of crude rubber, GR-S, and polyethylene stocks. The tests were made by 11 cooperating laboratories and included 9 recognized methods of performing stiffness tests. Test temperature ranged from —80° F. to +73.4° F. The wealth of data obtained from the studies is of considerable importance in view of the work being done by the Army, Navy, and Air Forces on use of materials under extremely low-temperature conditions. This investigation is only one of several contemplated by this committee. It is planned to carry on similar studies of brittleness and hardness of elastomeric materials.

At the meeting, results were reported of a round-robin investigation made by eight cooperating laboratories on hardness of crude rubber, GR-S, vinyl, and polyethylene stocks, at temperatures ranging from room temperature down to —80° F. These results will be correlated by Ross Shearer (Goodrich), in a further report to be presented in June. An interesting report of work being done by the Bureau of Ships was given by J. R. Britt. It was reported that the Tentative Method of Test for Brittle Temperature of Plastics and Elastomers (D746-52T) has now been included in Government Specification MIL-R-3065.

The properties and processing of silicone rubber as an insulating material for wire and cable are set forth in a new bulletin issued by the Chemical Division of General Electric, Pittsfield, Mass. Ask for CDS-13.

DUPONT RUBBER CHEMICALS DIVISION PROMOTES LAWRENCE AND FRITZ

H. Logan Lawrence

F. Herman Fritz, Jr.

Two promotions have been announced by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co. H. Logan Lawrence has been transferred from Boston to Wilmington to assume the newly created position of assistant sales manager for neoprene. F. Herman Fritz, Jr., has been shifted from Wilmington to Akron to become manager of the company's rubber laboratory there. Mr. Lawrence is a native of Memphis, Tenn., and received his Bachelor of Science degree in chemical engineering from the University of Missouri in 1934. The same year he joined Du Pont's Industrial Engineering Division at Deepwater Point, N. J. He was transferred in 1936 to the Rubber Chemicals Division for neoprene synthetic rubber sales promotion work. In 1941, he was assigned to the Rubber Laboratory at Deepwater Point in the tire development group. In 1946, he was recalled to Wilmington to become assistant sales manager of the export sales section. Mr. Lawrence was transferred to the Boston, Mass., district office of the Organic Chemicals Department in 1949, and from 1951 on he was sales supervisor for the Rubber Chemicals Division in that office. He is a member of the American Chemical Society and Alpha Chi Sigma chemical fraternity.

Mr. Fritz, who hails from Springfield, Mass., was graduated from Bucknell University in 1943 with a Bachelor of Science degree in chemical engineering. He joined the Firestone Industrial Products Co. at Noblesville, Ind., where he did development work on molded rubber products. In 1948, following a year in the U. S. Navy, Mr. Fritz went with Du Pont as a chemist-compounder in the mechanical rubber goods division of the Rubber Laboratory at Deepwater Point. He has been engaged in development of compounds and technical sales service work, both here and abroad. He has also made a number of contributions to the technical literature on rubber. Mr. Fritz is a member of the American Chemical Society's Rubber Division, Alpha Chi Sigma chemical fraternity, and was associated with the Philadelphia and New York Rubber Groups.

G-E Power Distribution Program

A visual program which outlines the latest electric power distribution practices for industrial plants has been announced by the General Electric Co. The new program presents 12 ideas to help industrial plants maintain power continuity, reduce installation and operating costs, safeguard personnel and equipment, and plan modern, efficient, flexible power systems. The latest in the G-E "More Power to America" series of presentations, it consists of a 35mm. sound-color slidefilm, a 28 page power distribution manual, and allied literature with additional product information. The entire package can be purchased outright from G-E for $25.

Cabot Offering Imported Silica

Godfrey L. Cabot, Inc., Boston, Mass., is now offering, from imported stocks, "Aerosil," a 99% pure silicon dioxide. The material is made by Deutsche-Gold- und Silber-Scheideanstalt Vormals Roessler, located near Frankfurt, Germany. Cabot says Aerosil is effective as a thickening and gelling agent in all types of fluids. It can also be used as an emulsion and pigment stabilizer and anti-caking agent. Aerosil particles are formed in a high temperature gaseous environment. Particle collection from the gas phase results in a production of low bulk density. Cabot states that when demand indicates, production facilities may be built in the United States.

ACS RUBBER DIVISION HOLDS ITS 62nd MEETING IN LOS ANGELES

The 62nd regular meeting of the Division of Rubber Chemistry of the American Chemical Society was held in Los Angeles, Calif., on March 18 and 19, in conjunction with the 123rd meeting of the parent society. Total A.C.S. registration for the meeting was approximately 4500, and although no separate registration was maintained for the Rubber Division, it is reliably estimated that such registration was between 400 and 450, a considerable improvement over that recorded at the regional meeting held by the Division in Los Angeles in 1948.

The Division Meeting featured the presentation of 20 technical papers at three technical sessions, all held at the Hotel Statler, a special Old Timers' Luncheon, and the Divisional banquet. Other activities included plant visits, among them being tours of the synthetic rubber plant operated by the Midland Rubber Corp. at Torrance, butadiene units operated by Shell Chemical, and the local plant of the B. F. Goodrich Co. A special Ladies' Program included visits to the movie studios, shopping centers, television studios, Los Angeles' famous Chinatown, and others.

The technical papers, abstracts of which were published in our January, 1953, issue, included two on guayule, three on chlorosulfonated polyethylene (Hypalon), and others on compounding, testing, weather aging, ozone formation, and vulcanization. The new program in Rubber Technology at the University of Southern California, headed by Dr. Harry Fisher and sponsored by the Los Angeles Rubber Group, was outlined in a paper prepared by Dr. Robert E. Vivian and Prof. Joseph S. Smatko, delivered by the latter. The initial technical session was opened by Seward Byam (DuPont), Divisional Chairman, with the usual introductory remarks. Mr. Byam presided over this first session, but James C. Walton (Boston Woven Hose), Divisional Vice-Chairman, presided over the second, and Dr. Ray B. Stringfield (Fullerton Mfg.) over the third session.

Hold Old Timers' Luncheon

Instead of a meeting of the 25-Year Club, a special Old Timers' Luncheon was held in the Golden State Room of the Statler Hotel on Wednesday, March 18, with R. E. Hutchinson (Firestone) as chairman. The luncheon was open to all members associated with the rubber industry and attracted approximately 175 members and guests. All those present signed a special, elaborate guest book, which was presented to Charles Lamb, who boasts of some 56 years of service in the rubber field. Honors for being the oldest individual present, however, went to Charles Bradley, who is 79. Dr. Bradley, who was associated with the U. S. Rubber Co. for many years, is currently active on special research projects at the California Institute of Technology at Pasadena.

Mr. Hutchinson, in his capacity as luncheon chairman, welcomed all those present, with a special welcome for the several dozen who had come from the East and Mid-West. During the course of the luncheon he introduced the 14 men sitting at the head table, including the following: E. B. Bridgwater (DuPont), R. B. Stringfield (Fullerton Mfg.), F. H. Banbury, C. E. Bradley (Caltech), E. B. Curtis (Vanderbilt), Harry Fisher (U.S.C.), S. G. Byam (DuPont), J. C. Walton (Boston Woven Hose), Ira Williams (Huber), Harry Outcault, Charles Haynes (Binney & Smith), A. R. Kemp, Amos Oakleaf (Phillips Chemical), and Norman Shepard (American Cyanamid).

Banquet at Breakfast Club

The Divisional Banquet was held at the Los Angeles Breakfast Club, a large, spacious building on Los Feliz Boulevard, on Thursday evening, March 19, with approximately 295 members and guests in attendance. After an excellent steak dinner, Mr. Byam delivered a short talk in which he traced the activities of the Division since its inception and pointed out that the current year marks the 25th anniversary of *Rubber Chemistry & Technology*. In all that time, he said, the editorial problems have rested in the capable hands of Dr. C. C. Davis (Boston Woven Hose).

Mr. Byam also indicated that the regular Spring Meeting of the Division will be held in Boston from May 27 to 29 and the Fall Meeting at Chicago from September 9 to 11, the latter a joint meeting with the parent society. He paid special tribute to the local arrangements committee at Los Angeles, headed by Deke Maddy (Harwick Standard Chemical), for a smooth functioning meeting, and then introduced those sitting on the dais, including Dr. Farrington Daniels, president of the society, Dr. Harry Fisher, the president-elect, Alden Emery, secretary, and Walter J. Murphy, editor of *Industrial & Engineering Chemistry*. Brief remarks were made by these four.

A special program of entertainment in the Hollywood style was presented at the banquet, featuring Pat Patrick as master of ceremonies, and including Winton and Diane (dance team), Patricia Lynn (vocalist), and Ruth Suvalle (accordionist). Music was furnished by Darrell Brewer's orchestra.

Special Luncheon at U.S.C.

Taking advantage of the Divisional Meeting, a special luncheon was sponsored by the Los Angeles Rubber Group at the Town and Gown Club on the University of Southern California campus on Thursday, March 19. Those invited included the officers of the Rubber Division, members of the Tlargi Educational Foundation, faculty members of the university, and a few guests. Purpose of the luncheon, at which Mr. Maddy acted as chairman, was to familiarize those present with the aims,

Some of the approximately 175 members and guests who attended the Old Timers' Luncheon on March 18 are shown above.

objectives, and current achievements of the Rubber Technology Foundation, sponsored by the local group.

The welcoming address was made by Dr. Albert S. Raubenheimer, educational vice-president of the university, who introduced the several faculty members present, including Dr. Fisher who is in charge of the rubber courses. Mr. Byam, Divisional Chairman, then introduced the officers and directors of the Division who were present, and Mr. Maddy outlined the full Tlargi Educational Program, to which approximately $100,000 has already been pledged.

Explains Courses Offered

Dr. Fisher, in turn, explained the courses in rubber technology being given at the university, described some of the equipment which will be installed in the rubber laboratory, including an ivory-toned F-B calender, and related a few anecdotes from his extensive experience in the rubber field. Among the latter, he quoted from a letter he had written in 1927 to Dr. H. E. Simmons, then chairman of the Rubber Division, in which he suggested that a meeting of the Division be held in Los Angeles with Dr. Stringfield as chairman.

Among the guests present at the luncheon were Dr. Daniels, president of the American Chemical Society, Dr. Per Frolich, formerly with the Standard Oil Development Co. and now associated with Merck & Co., F. H. Banbury, and M. E. Lerner of RUBBER AGE. Among members of the Tlargi Educational Committee present were C. H. Churchill (Sterling Rubber), chairman, and R. L. Short (Kirkhill Rubber), R. D. Abbott, C. E. McLaughlin (Royal), N. R. Pestal (Firestone), and A. L. Pickard (Braun Corp.).

Local Arrangements Committee

The success of the two-day Rubber Division meeting was due in large part to the excellent work of the Local Arrangements Committee which was headed by R. E. Bitter (Goodrich Chemical) as general chairman. Other members of the Local Arrangements Committee and the activities which they handled included: Roy Phelan (Atlas Sponge Rubber), treasurer; Arch J. Mease (DuPont), ways and means; E. C. McLaughlin (H. M. Royal), banquet; Carl S. Hoglund (R. D. Abbott), registration; A. H. Federico (C. P. Hall), publicity; Neil Pestal (Firestone), technical committee; R. E. Hutchinson (Firestone), Old Timers' Luncheon; and D. C. Maddy (Harwick Standard Chemical), liaison.

2-Butene-1,4-diol, an unsaturated glycol, is now available in limited quantities from the General Aniline & Film Corp., which is sponsoring a development program on high pressure actylene derivatives.

The new heat and chemical resistant synthetic hard rubber compound, "Tempron," is described in a new four-page bulletin released by the American Hard Rubber Co., New York, N. Y. Ask for Bulletin 96-B.

Taylor Joins Scott Testers

Rolla H. Taylor

Rolla H. Taylor has joined the staff of Scott Testers, Inc., as a sales engineer specializing in the application of Scott testing equipment to the problems of the rubber industry. Mr. Taylor acquired an intimate knowledge of the problems and methods of testing rubber through his association with the National Bureau of Standards commencing in 1930. He was largely responsible for the standardization of the Mooney Viscometer in the synthetic rubber program from 1943-48. Subsequently, he was attached to the Bureau of Agricultural Industrial Chemistry of the U. S. Department of Agriculture specializing in the evaluation of physical properties in the guayule rubber program. In addition, Mr. Taylor has been a night school instructor in materials engineering at George Washington University where he received his B. S. degree. He is the author of some 12 technical papers on rubber testing and has, since 1942, been active in Committee D-11 of the American Society for Testing Materials. He is an associate member of the Instrument Society of America and of the High Polymer Division of the American Physical Society.

Tabular Data on Synthetic

Phillips Chemical Co. has issued a folder which incorporates information on all polymers, masterbatches and latices presently being issued by the Office of Synthetic Rubber of the Reconstruction Finance Corporation. Table I, Part A, shows the old code numbers and the new polymers numbers which have replaced them. Part B of the same table shows the old and new codes for hot and cold latices. Table II concerns itself with data on available polymers, including price as of February 13, 1953. Table III, Part A, deals with hot, pigmented masterbatches, Part B, deals with cold, pigmented masterbatches, Part C, with cold, oil-extended, non-pigmented masterbatches, Part D, with cold-oil, pigmented, and Part E, with special rosin-acid masterbatches, non-pigmented. It should be noted that the tables published in this folder supercede those contained in the folder offered by the company on August 8, 1952.

Heavy Duty Express Tire

A new heavy duty highway truck tire with a "wonder tread" that is said to have cut tire costs as much as 35% in actual tests for leading truck fleets, has been announced by the B. F. Goodrich Co., Akron, Ohio. Actual tests have shown that the new tire clings to the road, provides improved traction and resists skidding. Although this tire is actually bigger, it is not a premium tire and will sell at standard prices. The "wonder tread" of the new Heavy Duty Express tire gives longer mileage and contributes to savings in operating costs because it is molded into a flatter, wider contour. Designed to put more rubber on the pavement, the tread contacts the road from shoulder to shoulder. The compressed tread is more abrasion-resistant and helps prevent tire growth and tire cracking. The tire is molded with the beads close together so that when the tire is mounted air pressure spreads the beads to rim width. The sidewalls then act as levers and put the tread under compression. Cooler running is provided by the tire's narrow buttresses in the shoulder design, which support the outside rib yet have open spaces to allow maximum cooling. Also incorporated in the new tire is the patented B. F. Goodrich Nylon shock shield construction, which is a standard feature in all Goodrich truck tires of 8 or more plies. The new Heavy Duty Highway Express tire is available in sizes ranging from 6.50-20 6-ply to 11.00-22 14-ply.

New Seiberling Patching Material

A dual-cushioned high tensile patching material for tire tread and sidewall repairs has been added to the repair material line of the Seiberling Rubber Co. E. F. Gates, manager of accessories and repair materials sales, said the new patch, developed to Seiberling specifications, differs from other patch material in that its rayon body is coated on the bottom side with a special heat-resisting gum, which eliminates tire failures due to heat "blows." The top side of the patch is coated with conventional black cushion gum. The material is available for all sizes up to and including the largest earthmover tires. Maximum patch dimension is given as 44 inches by 44 inches.

Solka-Floc D Dusting Agent

Brown Co., Berlin, N. H., has introduced "Solka-Floc D," a new cellulose base dusting agent. The product is said to offer low gravity and is ultra-fine for easy application. Non-toxic, Solka-Floc D is also non-abrasive and will not interfere with knitting in the mold. The company states that the product will not soften or streak, does not build up in the mold and is absorbed into the surface during molding. It is also said the Solka-Floc D improves cementability in soling, sponge, etc.

Changes in previously submitted questionnaires for the 1953-54 RUBBER RED BOOK will be accepted until May 1, 1953.

WASHINGTON HEARS DINSMORE DISCUSS NEW GOODYEAR RUBBER

The March 18th meeting of the Washington Rubber Group held in the auditorium of the Potomac Electric Power Company Building in Washington, D. C., heard an interesting address by Dr. R. P. Dinsmore, vice-president in charge of research and development for the Goodyear Tire & Rubber Co. Dr. Dinsmore spoke on "The New Goodyear Rubber." The speaker discussed a new type of synthetic rubber, "Chemigum SL," describing its history, chemical composition and properties.

Chemigum SL, Dr. Dinsmore stated, is chemically similar to the Vulcollan rubber which was developed by the Germans. Chemigum SL, however, possesses the advantages of processability on conventional rubber equipment, making possible a wide range of applications. Vulcollan, on the other hand, is molded by casting procedures, which, Dr. Dinsmore believes, limits its use to specialty items.

Dr. Dinsmore discussed the structural requirements of a good rubber and briefly reviewed the two chief methods of polymerization—addition polymerization and condensation. Unlike most rubbers, with the exception of the Thiokols, Chemigum SL is the result of a condensation polymerization. The first step consists of the formation of a polyester through the condensation of difunctional acids and alcohols such as adipic acid and ethylene glycol, and the elimination of water. The polyester is further acted with diisocyanates to extend the chain length. Water is then added to react with the isocyanate present at the chain extremities to form ureas having reactive hydrogens capable of further reaction with diisocyanates to provide the desired cross-linking.

By the use of proper control methods and the addition of amines in the preparation of the rubber, Goodyear makes a raw gum with a storage life of 6-12 months. Further, the foregoing procedures eliminates blistering tendencies and develop better properties in the finished material.

In addition to the uniqueness of its chemistry and method of preparation, the properties are outstanding in many respects. At 77° F., the molded rubber has a tensile strength of 5450 psi and an ultimate elongation at 750%, high rebound, Shore A of 65, freeze point of —38° F. and excellent resistance to ozone and ultra-violet light. Other properties of interest are high abrasion and tear resistance and minimum swell in SR-6 and SR-10 fluids. Electrical properties are reported to be equivalent to those of natural rubber.

At 200° F., the tensile strength of Chemigum SL, drops to 2860 psi with a slight increase in elongation to 84.5%. Exposure to dry aging at 212° F. results in a slight decline in tensile strength which is considerably less than that for natural rubber in gum, or tread stocks subjected to the same conditions. However, after 30 days at 158° F., the tensile strength drops to 4700 psi and after 14 days at 250° F. to 500 psi.

Under wet conditions at elevated temperatures, particularly above 100° F., some hydrolysis is experienced, with a resultant decrease in strength properties. Very little change has been found to occur in water at 77° F. Strong acids and alkalis exert a deteriorating effect on the finished rubber.

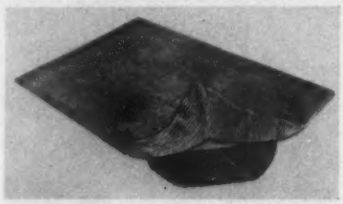
Dr. Dinsmore pointed out that the raw gum has no inherent building tack although the judicious use of methyl ethyl ketone helps considerably. Adhesion to other rubbers can be obtained through the use of tie stocks consisting of mixtures of the two stocks. Major compounding can be carried out in a Banbury followed by processing on cool rolls. Carbon blacks do very little to enhance the strength properties; concentration over 10-15 parts cause a decline in desirable properties. Ordinary plasticizers act as diluents.

Dr. Dinsmore provided an interesting display of several end-items which reflect the unique properties of Chemigum SL. Included in the display were the following: (a) Shoe soles—which showed superior wear compared to a standard rubber control in a 350 mile test; (b) Veneer on rubber tires with a standard carcass; (c) Solid Tires; (d) Liner on sand blast hose; (e) Flooring for cargo plane; (f) Oil seal ring; (g) Liner on pressure hose—oil resistant; (h) Decorative coating on rubber and veneer on luggage stock.

The future cost of Chemigum SL, Dr. Dinsmore pointed out, is indeterminate depending on uncertainties in the ultimate cost of the diisocyanate, which currently runs to several dollars a pound.

Changette Non-Slip Bath Mat

Dorothy Dean, 224 W. Washington St., Milwaukee, Wisc., has introduced the "Changette," a new, non-skid cushioned bathroom rug. The outer surface is of a chenille fabric, while the back is of green



sponge rubber. The fabric portion is so constructed that it slips easily over the rubber bottom. The large size is 24 by 36 inches while the small size is 18 by 30 inches. Both sizes are available in a wide range of colors.

Boston Group Hears Elliott

The Boston Rubber Group held its Spring Meeting on March 20 at the Hotel Somerset in Boston, Mass., with approximately 340 members and their guests in attendance. The technical session of the meeting featured an address by Dr. Paul M. Elliott of the Naugatuck Chemical Division of the U. S. Rubber Co. Dr. Elliott spoke on "Rubber Resin Blends—Unique Plastic Materials." The technical session was followed by a banquet. The after-dinner speaker was Dr. John Nicol Mark.

KITCHENER GROUP HEARS NEEDHAM SPEAK ON HISTORY OF TIRE CORD

E. R. Needham, technical superintendent of the Drummondville Cotton Co., Ltd., Drummondville, Que., Canada, addressed the March 10th meeting of the Kitchener Rubber Group of the Chemical Institute of Canada held at the Dominion Tire Office Canteen in Kitchener. Mr. Needham delivered an interesting talk on "Tire Cord." Approximately 25 members were in attendance.

Mr. Needham's talk covered the history and development of tire cord. Pioneers in the cotton industry such as Eli Whitney and Samuel Crompton were mentioned and their inventions outlined. Some of these inventions, although nearly 200 years old, are still used almost unmodified in the cotton industry today.

A comparison of cotton, rayon, nylon and Terylene was made with respect to physical properties. The speaker pointed out that cotton is the strongest. In spite of the fact, the use of nylon and rayon has gained tremendous headway in recent years. Research into the proper manner of using cotton to bring out its potential strength must be carried out, he said. In time, cotton, will come back into its own again and replace nylon and rayon in tire cord, the speaker predicted.

A development of the perfect tire cord was outlined followed by a 20 minute film on the growth and processing of cotton.

Firestone Receives High Awards

Firestone Tire and Rubber Co. and its chairman, Harvey S. Firestone, Jr., have received two high honors from the Freedoms Foundation. Mr. Firestone was awarded an honor medal in the Public Address category for his talk, "The Bonds of Brotherhood." The company's seven publications have been given the top award in the Employee Publications category of the Freedoms Foundation Awards Competition for 1952. J. E. Trainer, vice-president in charge of production, accepted the award for the company at ceremonies at Freedoms Foundation headquarters at Valley Forge, Penna., on February 22. Vice-President Richard Nixon presented the awards. The Firestone publications won the award in competition with several hundred other leading company publications. Mary Kerrigan, supervising editor for the publications, received a personal honor medal. The seven publications for which the top award in the Employee Publication category was given are: the "Firestone Non-Skid," for employees of the home plants in Akron, Ohio; the "Firestone Californian" at the Los Angeles, Calif., plant; the "Firestone Southerner," Memphis, Tenn.; the "Firestone News," Pottstown, Penna.; the "Firestone News," Fall River, Mass.; the "Firestone News," Gastonia, N. C.; and the "Ravenna Arsenal News," Ravenna, Ohio.

Manufacturer? Supplier? Consultant? You may be entitled to a listing in the 1953-54 RUBBER RED BOOK. Contact us for information.

ELASTOMER AND PLASTICS GROUP HEARS TALK ON EXPANDED VINYLS

The February 17th meeting of the Elastomer and Plastics Group, Northeastern Section of the American Chemical Society, held at the Massachusetts Institute of Technology in Cambridge, Mass., featured an address by M. J. Kleinfeld of the Naugatuck Chemical Division, U. S. Rubber Co. Mr. Kleinfeld spoke on "Expanded Vinyl Plastics."

In his address the speaker observed that expanded polyvinyl chlorides, now used to make many products ranging from ice buckets to thermal insulation for trucks used in the Arctic, have been largely a postwar development in this country. During World War II, the Germans produced large quantities of these expanded plastics for insulation and for many naval applications as replacements for cork and balsa wood. Following the war, technical missions brought reports to this country on German manufacturing techniques, but it was several years before full-scale work on expanded plastics started here.

Mr. Kleinfeld said four principal manufacturing methods have been and are being used: first, air is whipped into viscous mixtures of reactants which were then cured to form foamed plastics; second, carbon dioxide is formed in the mixture during manufacturing; third, inert gas is pumped into the mixture while under pressure and, after pressure was released, the plastic expanded. The fourth method, termed the most important by Mr. Kleinfeld, is the use of chemical blowing agents which react in the mixture to form gas bubbles expanding the plastic.

It is the chemical blowing agents that are being most widely used in this country today to produce expanded plastics, he said. There are two main groups, those forming carbon dioxide and those that form nitrogen. The CO_2 formers are used most in the production of open cell sponge rubber, rather than in unicellular expanded plastics where nitrogen-formers have given the most satisfactory results.

Germany's Porophor-N

The first nitrogen-forming agent, Porophor-N, was developed in Germany. It has not been widely adopted here, Mr. Kleinfeld said, because of reports that toxic vapors developed from the foam. The first non-toxic, odorless chemical blowing agent developed here, was Celogen, a product of Naugatuck Chemical. It is used to make a unicellular, non-interconnecting cell vinyl.

The blowing agents can be stirred in with the plastic ingredients, or they can be ground together with the ingredients for better dispersion. Depending on the amount of fluid plasticizer added, the composition forms a more or less viscous fluid. This fluid is poured into a mold and heated under pressure. After cooling, the fused molding is removed and allowed to expand for a short time at about 220 degrees Fahrenheit. The hardness of the finished product is determined by the ratio of plasticizer to the plastic resin.

A second method is generally used when a rigid or semi-rigid product is desired. In this method, the basic ingredients are processed on a warm two-roll mill. Solid sheets of the material are then cut or preformed to fit the mold. The molding cycle is aproximately 15 minutes at temperatures of 250 to 270 degrees Fahrenheit, plus 5 minutes at 320 to 330 degrees. Pressures of about 2000 pounds per square inch are then maintained until the molded part has cooled to 150 degrees. This is followed by heat treatment at about 220 degrees to permit further expansion.

In the third method, gas is mixed with the plastisol under pressure. When the mixture is discharged, it expands. High temperature fusion completes the process.

The inherent qualities of polyvinyl chloride suggest a number of uses for expanded polyvinyl chloride. It is the least flammable of a number of plastics also produced in expanded form. It is also tough and relatively inert. Unicellular expanded vinyl has low water absorption, and so, is buoyant. It also has good thermal insulating qualities, structural strength, ability to dissipate shock and aging characteristics.

Some of the uses being made today of expanded polyvinyl chloride are life rafts, life jackets, cable and fish net floats, paddings in helmets and athletic equipment and chest cavity fillers to replace collapsed lungs, Mr. Kleinfeld concluded.

Darex R8 Hot Melt Adhesive

A new hot melt adhesive for shank cementing which is said to provide immediate bond, high strength, improved impact resistance and low unit cost has been developed by the Dewey and Almy Chemical Co. Now in production by the company's Shoe Products Division, the new hot melt, "Darex R8," is designed to attach all types of shanks in a permanently flexible resin bond. It contains no water or solvent to evaporate, and unlike asphalt or resin pitches, does not crystallize, permitting noisy or loose shanks. It sticks to wood, fiber and steel, and is not hampered by humidity. It provides high yield with no waste, the company states. Clean, fast application is made either by a heated grid pan or conventional pitch applicator. A new hot melt spotting machine has been developed especially for the purpose. In this new machine correct application temperatures are easily maintained.

GOODYEAR DEVELOPS NEW EXTREMELY LOW-PRESSURE "ROLLIGON" TIRE

This photograph, showing the "Rolligon" tire rolling over its inventor, attests to the tire's ability to "swallow up obstacles."

Preliminary trial runs of a new type of extremely low-pressure tire have just been completed successfully, according to a joint statement issued by William H. Albee, inventor-designer, and the Goodyear Tire & Rubber Co. The new tires, designated as "Rolligons," impart to the vehicle on which they are mounted the ability to operate easily and without springs over sand and on soft ground and over obstructions and rugged terrain. Their design is expected to find wide application in military service, industry and agriculture. The Rolligon is soft and fat like a watermelon-shaped balloon. It supports the load of the vehicle and allows it to roll along the surface of the ground. Although it has an axle to hold it in position, this axle does not drive the Rolligon the way automobile tires are driven. The Rolligon is driven by a series of rotating rollers on the under side of the vehicle carriage, which rub against the top surface of the balloon-like structure and roll it along.

Goodyear molds the Rolligons, using only one ply of rubberized fabric, topped by a quarter-inch layer of gum rubber tread stock. The Rolligons are operated with air pressures of only 1½ to 5 pounds per square inch. The low-pressure inflation enables a heavily-loaded vehicle supported on Rolligons to be driven safely and comfortably over soft, unstable or rough ground, the company states. Purpose of the trial runs was to demonstrate, by the powering of four Rolligons mounted in a rigid frame, their pulling power, hill climbing ability and hillside stability, as well as their ability to operate over obstructions and various types of terrain, the company stated.

ONTARIO SECTION HEARS MAASSEN ON LIGNIN-RUBBER COMBINATIONS

The March 10th meeting of the Ontario Rubber Section of the Chemical Institute of Canada held at Hart House at the University of Toronto, featured an address by G. C. Maassen of the R. T. Vanderbilt Co. Mr. Maassen spoke on "Acceleration Systems for Lignin-Natural Rubber Combinations."

The speaker noted that in order that lignin may be used as a reinforcing material in elastomeric polymers it is necessary that it be co-precipitated with the latex. Co-precipitates of lignin with GR-S latex lend themselves to vulcanization by the conventional accelerators used for GR-S in quantities commonly used in practice. Co-precipitates of lignin with natural rubber latex do not vulcanize when quantities of accelerators normally used for rubber are employed.

In the past, best results were obtained by using sulfur, thiazoles and dithiocarbamates activated by substantial quantities of metallic oxides such as lead, copper and bismuth. It has been learned, Mr. Maassen stated, that by the use of sulfur, "Altax," "Tuads" and "Bismate," lignin-natural rubber co-precipitates can be vulcanized so as to retain all of the desirable features imparted by lignin when used as a reinforcing agent plus improved scorch characteristics, better aging and lower cost.

Neoprene Painting System

Pennsylvania Salt Manufacturing Co., Philadelphia, Penna., has introduced a new system of anti-corrosion coating using specially formulated neoprene coatings. The special formulations are "NeoCoat" and "NeoPrime A" (for all surfaces except concrete) and "NeoPrime B" (for concrete surfaces). NeoCoat is a true plastic, involving polymerization, in which the accelerator is included in the product, thus eliminating the necessity of mixing on the job. The polymerization takes place after the coating is applied. Pennsalt has found that to stand up in service, a coating had to be built up to a thickness of at least 5 mils, regardless of its corrosion resistance, and had to be especially effective in covering welds, beads seams and edges where coatings most frequently failed. Therefore, NeoPrime and NeoCoat were formulated to attain the proper thickness within three coats.

Astin Leaves Standards Bureau

Dr. Allen V. Astin resigned by request on March 31 as director of the National Bureau of Standards. The resignation was requested by Sinclair Weeks, Secretary of Commerce, following a controversy that led Mr. Weeks to question the integrity of the Bureau's testing work. The testing work in question was concerned with battery additives intended to lengthen the life of lead storage batteries. Dr. Astin, a government career scientist, joined the Bureau in 1932 as a research chemist. He became acting director of the Bureau in October, 1951, following the resignation of Dr. Edward U. Condon, and was appointed director in June, 1952.

Coming Events in the Rubber Industry

Apr. 16. Quebec Rubber and Plastics Group in Joint Meeting with S.P.E. and S.P.I., Queen's Hotel, Montreal, Que., Canada.

Apr. 17. Detroit Rubber and Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Apr. 28-29. Rubber and Plastics Division, A.S.M.E., Columbus, Ohio.

May 1. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

May 5. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

May 7. No. California Rubber Group, Elk's Club, Berkeley, Calif.

May 15. Buffalo Rubber Group, International Meeting, Jointly with the Ontario Rubber Section C.I.C., General Brock Hotel, Niagara Falls, Ont., Canada.

May 19. Elastomer and Plastics Group, Northeastern Section, A.C.S., Massachusetts Institute of Technology, Cambridge, Mass.

May 22. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

May 27-29. Rubber Division, A.C.S., Spring Meeting, Hotel Statler, Boston, Mass.

June 5. Division of Rubber Chemistry, C.I.C., Windsor, Ont., Canada.

June 6. So. Ohio Rubber Group, Summer Outing, Inland Recreation Center, Dayton, Ohio.

June 9-11. International Aviation Trade Show, Hotel Statler, New York, N. Y.

June 11. New York Rubber Group, Summer Outing, Sundance Lodge, Caldwell, N. J.

June 19. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 19. Boston Rubber Group, Summer Outing.

June 23. Buffalo Rubber Group, Summer Outing.

June 26. Detroit Rubber and Plastics Group, Summer Outing, Hillcrest Golf Club, Detroit, Mich.

June 29-July 3. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 24. Chicago Rubber Group, Summer Outing.

Aug. 4. New York Rubber Group, Golf Tournament.

Aug. 21. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Sept. 9-11. Rubber Division, A.C.S., Fall Meeting, Hotel Sherman, Chicago, Ill.

Sept. 17. So. Ohio Rubber Group, Engineers' Club, Dayton, Ohio.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 6. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 6. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

Oct. 16. Boston Rubber Group, Fall Meeting, Hotel Somerset, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 23. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Nov. 10. Los Angeles Rubber Group, Hotel Statler, Los Angeles, Calif.

Nov. 13. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Dec. 11. Boston Rubber Group, Xmas Party, Hotel Somerset, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Xmas Party, Sheraton-Cadillac Hotel, Detroit, Mich.

Dec. 11. New York Rubber Group, Xmas Party, Henry Hudson Hotel, New York, N. Y.

Dec. 12. So. Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.

Dec. 15. Buffalo Rubber Group, Xmas Party.

Jan. 24, 1954. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Apr. 14-16, 1954. Rubber Division, A.C.S., Spring Meeting, Hotel Brown, Louisville, Ky.

Sept. 15-17, 1954. Rubber Division, A.C.S., Fall Meeting, Hotel Commodore, New York, N. Y.

AKRON GROUP ELECTS OFFICERS; HEARS TRAINER DELIVER TALK

Approximately 550 members and guests of the Akron Rubber Group attended the March 27th meeting held at the Mayflower Hotel in Akron, Ohio. The meeting featured an election of officers for the 1953-54 season and the presentation of an interesting address by J. E. Trainer, vice-president in charge of production for the Firestone Tire & Rubber Co.

Officers named for the 1953-54 season of the group which begins on September 1, 1953, include the following: *Chairman,* Roy H. Marston (Binney & Smith); *Vice-Chairman,* V. L. Peterson (Goodyear); *Secretary,* Fred W. Gage (Columbia-Southern); *Treasurer,* Harry M. Brubaker (Witco). Dale F. Behney (Harwick Standard) headed the Nominating Committee assisted by C. F. Ritchie (Goodrich) and E. L. Stangor (DuPont).

In his address, Mr. Trainer pointed out that industry has merely scratched the surface of rubber usage in many fields despite the inroads of plastics. He noted the unlimited rubber requirements in such fields as foam rubber, latex paints, paving compounds and other surfacing materials. He said he has boundless enthusiasm about the future of the rubber industry. The vast growth in the number of automobiles was cited as a major factor in the continuing expansion of rubber usage.

Mr. Trainer admitted that plastics have replaced rubber in many fields and that they have made an impressive advance in the last ten years. Instead of looking upon this as a threat to the rubber industry, he opined, we should look upon it as an opportunity for expansion of business.

The dividing line between rubber and plastic raw materials is a vague one, he stated. The similarity between rubber and plastics does not stop with raw materials. It extends also to production techniques and equipment. "I believe, therefore, that the plastics field affords added reason for optimism about the future of the rubber industry."

Mr. Trainer also touched upon the critical condition of the nation's highways. He emphasized the need of some states to pursue vigorously an intelligent program of highway system improvement.

Synthetic Rubber Sales Catalog

The Sales Division, Office of Synthetic Rubber, Reconstruction Finance Corporation, has issued a sales catalog on GR-S and GR-I type synthetic rubbers as a guide to rubber consumers. Sections of the catalog are separated by tabs and cover hot GR-S polymers, hot GR-S black masterbatch polymers, cold GR-S polymers, cold GR-S black masterbatch, oil-masterbatch and oil-black-masterbatch polymers, hot and cold GR-S latices, and GR-I polymers. General information is furnished in one section while reference tables are included in another. Considerable data is furnished on the individual polymers. As additional information on these and new polymers is compiled, copies will be furnished to all users of the catalog for insertion.

Use of Latex-Water Paints

A revolution in the United States paint industry during the past five years has been caused by the development of water or latex paints which incorporate synthetic resins and rubber products, according to R. S. Aries and Associates. Latex paint consumption breaks down in the following manner: In 1949, 2,000,000 gallons were consumed; in 1950, 3,500,000 gallons; in 1951, 30,000,000 gallons; and in 1952, 40,000,000 gallons. In 1952, about 15% of all paint, varnish, and lacquer sales were in latex paints. In terms of interior paints, 45% of the sales dollar is now coming from the latex-based products, a retail value of about $175,000,000. Exterior water paints, which are now only finding a market, are particularly good for stucco, masonry and stone and are very appropriate in areas with milder climates. Reliable estimates indicate a possibility of 80,000,000 gallons of latex paints by 1957.

Develops New Neoprene Cement

A new stable fast-curing neoprene cement has been developed by the Firestone Tire and Rubber Co. While the new adhesive has countless industrial uses in the manufacture of neoprene-coated products, its greatest immediate need is in the emergency repair of equipment used by our fighting men in Korea, the company states. The new Firestone cement is thermosetting—the bond gets stronger as the temperature increases. Tension tests have been successfully conducted on patched fabrics in temperatures up to 150 degrees Fahrenheit. As the tension increases, the fabric breaks down but the cement holds firm. The new cement is likewise not affected by cold. It will thermoset at temperatures far below the functioning point of natural rubber cements. The new fast-curing neoprene cement is complete within itself and requires no accelerators or additives of any kind. Once applied, it forms an inseparable bond within a few hours.

Taylor Joins Mansfield Tire

Paul C. Taylor, formerly director of engineering at the Ohio Rubber Co., has joined the Mansfield Tire & Rubber Co. in a similar capacity. Prior to his association with Ohio Rubber, Mr. Taylor was associated with the B. F. Goodrich Co. as a project and construction engineer. While with Goodrich, he was responsible for the design and installation of the tire and tube plant at Bogota, Colombia. He also spent eight weeks in Europe for Goodrich conducting a post-war engineering survey in England, France and Holland. He left Goodrich and joined Ohio Rubber in April, 1946, where he remained until his new appointment with Mansfield Tire.

CHICAGO HEARS WERKENTHIN ON SHIPBOARD RUBBER APPLICATIONS

The March 27th meeting of the Chicago Rubber Group held at the Furniture Mart in Chicago, Ill., featured an address by T. A. Werkenthin, head of the Elastomer Branch of the Bureau of Ships, Department of the Navy. Mr. Werkenthin spoke on "Shipboard Rubber Applications."

Mr. Werkenthin observed that an aircraft carrier of the Midway class will require approximately 75,000 pounds of rubber. Since the average passenger car tire requires about five pounds of rubber, this amount is equivalent to about 15,000 tires. Battleships like the U. S. S. Missouri, on the other hand, will require about 55,000 pounds of rubber, while destroyers average about 4,500 pounds. Smaller naval vessels may require anywhere from 500 to 3,000 pounds of rubber, he said.

The speaker then went on to outline the various types of rubber used in various shipboard applications. These included underwater coatings and protective coverings, deck coatings, decking and matting, tank coatings, caulking compounds, submarine battery compartment lining, shaft covering, water lubricated bearings, mounts, expansion joints, watertight and airtight door and hatch gaskets and hose.

Also discussed was life saving equipment, clothing, and special rubber applications. He also outlined the Naval uses of rubber in safety equipment, gas masks, fire fighting equipment, protective equipment for guided missile fuels, and other rubber items for protection of personnel.

Mr. Werkenthin distributed to the audience a comprehensive list of rubber material procured by the Bureau of Ships, giving specifications, sizes, etc. He also distributed a bibliography of articles on rubber uses. Copies of "Visual Inspection Guide for Rubber Hose" and a "Glossary of Terms for Visible Defects Occurring in Rubber Manufacture" were also given the audience. Mr. Werkenthin also answered questions on the subject from the audience.

The meeting of the Chicago group also featured an address by Lt. Colonel Howard T. Markey who offered an interesting address on an "Airman's View of Korea."

Luscomb Joins W. C. Hardesty

T. A. Luscombe has been appointed to the sales staff of W. C. Hardesty Co. of Canada Ltd., according to a recent announcement. Mr. Luscombe has many years of experience in the oils and fats, protective coatings and the general chemical industries. It has also been announced that P. D. O'Rourke will be sales representative for all South Western Ontario. Mr. O'Rourke has been associated with this company for the past eight years in both production and sales.

Polyvinyl Isobutyl Ether (PVI) is now available in drum lots from the General Aniline & Film Corp. in three molecular weight grades which range from a tacky semi-solid to an amorphous white powder.

NAMES IN THE NEWS

ALBERT H. CLEM, formerly assistant general sales manager of the Pennsylvania Salt Manufacturing Co., Philadelphia, Penna., has been named general sales manager, succeeding the late RUSSELL S. ROELLER.

W. A. DEL MAR, chairman of the Research and Development Committee of the Phelps Dodge Copper Products Corp., and chief engineer of the Habirshaw Cable & Wire Division of that company, has returned from London where he received the Fellowship of the City and Guilds of London Institute, the diploma of which was presented to him by Prince Philip.

JAMES K. LINDSAY, previously a partner in the law firm of Fulton, Walter and Halley, has been elected secretary of the Heyden Chemical Corp., New York, N. Y., succeeding PAUL VAN DER STRICHT, who has resigned.

CARL H. POTTENGER, formerly assistant sales manager of the Chemical Division of the Koppers Co., Pittsburgh, Penna., has been promoted to the position of assistant vice-president and division sales manager, succeeding T. C. KEELING, JR., who recently resigned to become president of the Hydrocarbons Division of the Mathieson Chemical Corp. of Baltimore, Md.

JOHN J. WALBECK, formerly assistant manager of advertising and merchandising for the Seiberling Rubber Co., Akron, Ohio. has been named manager of passenger tire and tube sales, succeeding the late JOHN R. LOTZE.

ROBERT S. SANDERS, manager of Pliobond sales for the Goodyear Tire & Rubber Co., was recently presented with a pin by the company honoring his completion of 30 years' service with the firm.

JOHN L. BROOKS, previously Dallas district credit manager for the Replacement Tire Division of the B. F. Goodrich Co., has been named division operating manager, succeeding the late CHARLES B. KAHLER.

JACK W. BRANDT, associated with the B. F. Goodrich Co. since 1944, has been named plant appraisal accountant, succeeding FRED B. EGGLESTON, who recently retired.

DONALD G. WRIGHT, formerly associated with the Chrysler Corp., has been named assistant to the president of the Standard Products Co., Cleveland, Ohio.

BURNHAM B. HOLMES, associated with the Ball Brothers Co., Muncie, Ind., since 1950, has been named vice-president in charge of paper products, purchasing and traffic.

DR. VLON N. MORRIS, formerly director of research for Shellman Products, has been named executive secretary of the Council of Research Directors of the combined family of companies of Johnson & Johnson.

ALBERT B. DISS, formerly vice-president in charge of manufacturing for the Watson-Stillman Co., division of H. K. Porter Co., has been named vice-president and general manager.

HOWARD BLISS, previously assistant manager of the Pennsylvania Athletic Products Division of the General Tire & Rubber Co., has been named sales manager of the division.

ROSS W. BENNINGTON, associated with the U. S. Rubber Co. since 1939, has been appointed to the newly-created position of general traffic manager of the company.

CHARLES W. KLINE, associated with the Boston Woven Hose & Rubber Co. for the past 17 years, has been named New England Division Manager, responsible for the entnre New England sales force.

HUBERT E. FRANCIS has been named production manager of Duroflex, Inc., a company recently formed at Buena Vista, Va.

F. BRITTAIN KENNEDY, president and owner of F. Brittain Kennedy & Co., Boston investment firm, has been elected to the board of directors of the Boston Woven Hose & Rubber Co.

GENERAL H. F. SAFFORD, president of the Ohio Rubber Co., a subsidiary of the Eagle-Picher Co., has been elected a vice-president and a member of the board of directors of the parent concern.

Japanese—R. S. Aries Agreement

Initial production of the several modern grades of titanium dioxide will begin in late 1953, according to a simultaneous announcement made by Eijiro Fujise, president of Nippon Titanium Co., Inc., in Tokyo, and Dr. Robert S. Aries, president of R. S. Aries and Associates, consulting chemical engineers, 400 Madison Ave., New York 17, N. Y. The arrangement reached by these two companies provides for the production of improved types and for expansion of present production of titanium dioxide. A new plant is already being built according to plans mutually agreed upon by engineers of the two companies and will have a capacity of 150 tons per month of the several varieties of the pure white pigment by the end of 1953. According to Mr. Fujise, expansion to double this production is planned within the next year; and continuing expansion in both the quantity and the varieties of material produced are programmed for the immediate future.

Moor Elected Gro-Cord President

Forest Moor

Forest Moor, formerly vice-president of the Gro-Cord Rubber Co., Lima, Ohio, was elected president of the company at the 34th annual meeting held recently in Lima. He succeeds Fred W. Cook, who was elected chairman of the board. Mr. Moor has been actively associated with the company for the past ten years, and has been a director for eight years. Prior to service in the U. S. Army during World War II, Mr. Moor was vice-president and general manager of the company. Upon his return to the company, he was named secretary and treasurer, positions he held until September 1, 1951, when he was named vice-president and general manager once again. Mr. Moor is a director of the Rubber Heel and Sole Institute and director and treasurer of the Elastic Colloid Research Corp. Mr. Cook has been associated with the company since its inception in 1920. He served as treasurer of the company for 20 years and in 1939 was elected president. For many years he served as president of the Autokraft Box Corp. until his retirement from active affairs in that firm in 1945. Both Mr. Moor and Mr. Cook were simultaneously elected to the same positions in the company's wholly-owned subsidiary, Gro-Cord Rubber Co. of Canada, Ltd. All other officers of the firm were re-elected as follows: Harold Smith, vice-president and assistant treasurer; Winston L. Hunt, secretary and treasurer; Melvin C. Light, assistant secretary; and J. S. McKindsey, vice-president and sales manager.

Correction

Due to a slip of the hand, the head on the article covering the impregnation of leather with butyl which appeared on page 624 of our February, 1953, issue, indicated the impregnant was Butyl Rubber. As indicated in the article itself, the impregnant was actually polyisobutylene. The butyl-impregnation process described was developed by the Leather Laboratory of the National Bureau of Standards.

An index to Volume 72 of RUBBER AGE will be found on Pages 147 to 150 of this issue.

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Firestone Tubeless Truck Tire

A new truck tire which is tubeless and mounted on a one-piece, drop-center rim has been developed by the Firestone Tire and Rubber Co., according to Raymond C. Firestone, vice-president in charge of research and development. "The greatest departure from conventional truck tire design in the new product," Mr. Firestone says, "is the new bead construction." A conventional tire is held on the rim by flanges of substantial height. The new tire is supported on the rim by a tapered fit so that the customary high flanges are no longer necessary. Lowering of the rim flange permits the new tire to be mounted on a one-piece drop-center rim. The forced taper fit permits a lighter construction bead. The combination of lowered flange plus forced-taper fit radically reduces the forces on the rim so that a substantially lighter rim is now possible. To carry this simplification further, that portion of the tire normally back of the flange has been eliminated so that a significant material and weight saving is made with no sacrifice in ultimate tire mileage or durability. The tread, body and sidewall construction of the new Firestone tubeless truck tire are essentially the same as tires now in use. The air impervious innerliner, which replaces the tube, is an inherent vulcanized part of the casing. The troublesome tube and flap are eliminated. The difficulty normally encountered in mounting a truck tire, tube and flap on a two or three-piece rim has been reduced to a minimum. Mounting and demounting of heavy, over-the-highway truck tires is as easy as a passenger car tire. The Firestone tubeless truck tire and drop-center rim is a unit assembly and as such can be made to fit hub and wheel mountings of trucks now in use, giving identical clearances.

Battelle Information Service

A new technological information service has been established at Battelle Institute, Columbus, Ohio. The service is aimed at assisting science and industry in streamlining the costly and burdensome job of tapping existing published knowledge. The new service to technology will be tailored to meet individual needs. It will include the preparation of bibliographies, and coding and classification systems. Where required, the Institute will undertake development of information on processing equipment. Battelle staff members assigned to the new service include Dr. Robert C. McMaster, supervisor of electrical engineering research, Dr. Iver Igelsrud, technical librarian, Roger L. Merrill, and Alvin T. Maierson.

Expanding Latex Thread Output

B. F. Goodrich Co. has announced plans to increase its production of latex thread at Plant 4 in Akron, Ohio. New thread-making and cutting equipment are now being installed, while the entire thread-making operation is being consolidated. First production from the expanded facilities was to have begun in April, while the entire consolidated unit will be in full production late this year.

McCarthy Joins Goodrich Chemical

William J. McCarthy

The Hycar Rubber Section of the Sales Development Laboratory, B. F. Goodrich Chemical Co., has been enlarged with the addition of William J. McCarthy, development engineer. Mr. McCarthy received his master of science degree from Trinity College in 1939. Prior to joining Goodrich Chemical, Mr. McCarthy served for more than nine years with the Office of Synthetic Rubber of the Reconstruction Finance Corporation at Washington, D. C., as a field representative and as chief of the Finished Products Unit. A member of the Division of Rubber Chemistry of the American Chemical Society, Mr. McCarthy is also present secretary of the Washington Rubber Group.

General Tire Names Wunderley

The appointment of a new sales agent for the Chemical Division of the General Tire & Rubber Co. was recently announced. W. Glenn Wunderley of Pasadena, Calif., has been named exclusive sales agent in California, Oregon, and Washington for the following products manufactured by General Tire's Chemical Division: Gen-Tac Latex, vinyl pyridine latex; Gen-Tac Resin, water-soluble phenol-formaldehyde resin; Ko Blend I. S., latex-compounded masterbatch of insoluble sulfur in GR-S; Kalabond, rubber-to-metal adhesive; Actogen, accelerator activator; and Polystop, GR-S polymerization shortstop. Mr. Wunderley, former sales manager of the Fisher Scientific Co. in Pittsburgh, Penna., has represented several well-known concerns on the West Coast since 1945.

Form Elastic Threads, Inc.

Elastic Threads, Inc., a Delaware Corp., has purchased a factory site in East Providence, R. I., on which will be constructed a plant for the manufacture of rubber thread. Robert Alexander, named superintendent of the new plant, said that the new concern plans a modern, one-story plant of cinder block construction. About 50 persons will be employed at the start of operations, which are scheduled for the fall of 1953.

"Griptop" Conveyor Belt

Packages and cartons can glide up or down grades as steep as 55 degrees for what is said to be the first time on a new conveyor belt developed by the B. F. Goodrich Co. Steep angle operation means savings in space wherever containers are belt-conveyed in factories, stores, warehouses and shipping rooms. Called "Griptop," the new package conveyor belt has a special ridged and cross-cut rubber surface which provides the extra gripping power needed to operate on grades above 30 degrees. The flexible, molded rubber ridges are parallel and run across the belt width. They stand one-quarter inch high and are cross-cut to form more than 5,700 tiny gripping blocks of rubber every square foot. As an example of space savings now possible with the new belt, Goodrich engineers say that by designing installations at 45 degrees, 42% less floor space is needed than that required for installations designed at 30 degrees. On the same basis, conveyors shorter by 29% can be used, resulting in lower belt replacement costs. The company said that the usual angle limit of other package conveyor belts is 30 degrees. Griptop is said to be the first package conveyor belt designed with self-cleaning action. As the belt travels around pulleys, the ridges of tiny rubber blocks fan out and release material which may have lodged in the grooves. Uniformity of design allows the cover to wear at a constant rate. Initial carrying angle is maintained throughout the life of the belt, Goodrich states.

Moves Chicago Branch Office

Pratt and Whitney of West Hartford, Conn., has announced the relocation of its Chicago branch office to new, larger quarters at 4649 West Fullerton Ave., Chicago 39, Ill. The new telephone number is Humboldt 9-1626. The new building was specially planned and erected to provide better facilities for carrying a more comprehensive Chicago stock of regularly listed P & W Cutting Tools and Gages and to give adequate office area for the factory-trained sales and service personnel associated with the large line of precision machine tools, cutting tools and gages produced by Pratt and Whitney and its subsidiary, Potter and Johnston Co. of Pawtucket, R. I. The new office will be under the management of C. G. Cunningham, district manager.

Snell CMR File Service

Foster D. Snell, Inc., New York, N. Y., has announced a new marketing service called the "CMR File Summary." This file summary is compiled from Snell's monthly chemical industry abstract service, the "Chemical Market Report." The report includes all information on chemicals, chemical companies or chemical consuming industries published in periodicals dealing with marketing news. The CMR File Summary will provide a review of the Chemical Market Report and break this information down so that those interested may obtain a complete set of published news and information on any particular product.

SAE-ASTM ANNOUNCE REVISIONS OF AUTO RUBBER SPECIFICATIONS

The American Society for Testing Materials and the Society of Automotive Engineers have recently published the 1952 revision of the SAE-ASTM Specifications for Rubber and Synthetic Rubber Compounds for Automotive and Aeronautical Applications (ASTM D735; SAE 10R). These specifications have been prepared by the Technical Committee on Automotive Rubber which is jointly sponsored by these two societies, and is composed of technologists from both the automotive and rubber industries.

The results of their work were first released in 1943 as ASTM D735 and SAE Standard R10. A revision of this specification was published in 1948 and a further revision in 1951. These specifications establish a means of classifying and describing by standard methods the many rubber and synthetic rubber compositions in use in automotive rubber products. While many industrial and mechanical goods applications also may be adequately and conveniently served by the classification system, the Committee did not intend that their specifications describe compounds for tires, inner tubes, sponge rubber, belts, hose, mats, hard rubber and insulated wire and cable, or those prepared from latex.

Type Segregation Discontinued

In former versions of these specifications, an attempt was made to segregate natural rubber compounds from those made from GR-S. In the present revision this segregation was discontinued. Rubber and synthetic rubber compositions are divided into two basic types: Those requiring no specific resistance to the action of petroleum-base fluids are identified as Type R; and those requiring specific degrees of resistance identified as Type S. This year a new classification of synthetic rubber compounds has been added. This classification, identified by Type T, describes compositions having specific resistance to the effect of prolonged exposure to abnormal temperatures and to compounded petroleum oils.

Type R compounds are not further described as to classes of elastomers and it is the Committee's intention that they be prepared using natural, reclaim, and synthetic rubber, or mixtures thereof, as the base, provided the requirements of the specifications are met. The Type S compositions, which are normally used where resistance to swelling action by oil is required, are subdivided into three classes—Class SA, describes compositions having very low volume swell in petroleum hydrocarbons. In practice such compounds are normally made from polysulfide-organic dihalide polymers (Thiokol).

Class SB compounds are characterized as having low volume swell in petroleum hydrocarbons and normally describe compounds made from copolymers containing acrylonitrile. Class SC describes compounds having medium volume swell in petroleum hydrocarbons. Such compounds are normally made from neoprene as the base material.

Suffix Letters Designating Additional Quality Requirements as Announced by SAE-ASTM Committee on Automotive Rubber

Suffix Letter	*Requirement*
C	Weather resistance test. As yet no standard method is available.
D	Load deflection test. Values have been established for Type R compounds only and the test is conducted in accordance with "Standard Methods of Test for Compression-Deflection Characteristics of Vulcanized Rubber" (ASTM Designation: D575).
E_1	Oil immersion test. Values are specified for Classes SA, SB, SC and TA. These tests are made in ASTM Petroleum-Base Oil No. 1 as specified according to "Tentative Methods of Test for Changes in Properties of Rubber and Rubber-Like Materials in Liquids" (ASTM Designation: D471).
E_3	Oil immersion test. Values are specified for Classes SA, SB, SC and TA. These tests are made in ASTM Petroleum-Base Oil No. 3 as specified according to "Tentative Methods of Test for Changes in Properties of Rubber and Rubber-Like Materials in Liquids" (ASTM Designation: D471).
E_4	Oil immersion test. Values are specified for Class TB. Tests are made in a blend of Petroleum-Base Oil No. 1 and a hydrocarbon composition containing sulfur and chlorine constituents of controlled activity toward metal surfaces. This composition is a typical additive for extreme pressure lubricants. The test is made according to the methods of ASTM Designation D471, "Tentative Methods of Test for Changes in Properties of Rubber and Rubber-Like Materials in Liquids."
F_1	Low-temperature tests at —40 F. This is a brittleness test conducted according to "Tentative Method of Test for Low Temperature Brittleness of Rubber and Rubber-Like Materials" (ASTM Designation: D736).
F_2	Low-temperature tests at —65 F. This is a brittleness test conducted according to "Tentative Method of Test for Low Temperature Brittleness of Rubber and Rubber-Like Materials" (ASTM Designation: D736).
G	Tear test. No values are specified. However, the test is conducted according to "Standard Methods of Test for Tear Resistance of Vulcanized Rubber" (ASTM Designation: D624).
H	Flexing test. No values are specified. However, the test is conducted according to "Tentative Methods of Test for Dynamic Ply Separation and Cracking of Rubber Products" (ASTM Designation: D430).
J	Abrasion test. No values are specified. However, the test is conducted according to "Tentative Methods of Test for Abrasion Resistance of Rubber Compounds" (ASTM Designation: D394).
K	Adhesion test. No values are specified. However, the test is conducted according to "Tentative Method of Test for Adhesion of Vulcanized Rubber to Metal" (ASTM Designation: D429).
L	Moisture absorption test. Values are specified for Class TA. The test is conducted according to "Tentative Methods of Test for Changes in Properties of Rubber and Rubber-Like Materials in Liquids" (ASTM Designation: D471).
M	Inflammability test. No values are specified. As yet no standard method is available.
N	Repeated impact test. No values are specified. As yet no standard method is available.
P	Staining test. No values are specified. However, the test is conducted according to "Tentative Methods of Test for Contact and Migration Stain of Vulcanized Rubber in Contact with Organic Finishes" (ASTM Designation: D925).
R	Resilience test. Values are specified for Classes R and SC. The test is conducted according to "Tentative Methods of Test for Mechanical Properties of Elastomeric Vulcanizates under Compressive or Shear Strains by the Mechanical Oscillograph" (ASTM Designation: D945).
Z	Special tests. Any special characteristics of functional requirements, other than those prescribed by the other suffix letters, which may be desired for specific applications (for example, resistance to ozone or special fluids) shall be specified under Suffix Z.

Type T compounds are divided into two classes. Class TA compounds are intended for services where outstanding resistance to change by extreme heat and cold are required. These compositions are normally made from silicone. Class TB compounds are intended for services where outstanding resistance to change by severe heat and in hot petroleum hydrocarbons, including those modified with sulfur compounds, is required. These compositions are normally made from polyacrylic rubbers as the base material.

The specifications further provide for different grades within each class. The grades are designated by a number representing the hardness, and tensile strength properties of the stock. In the former versions of these specifications, these properties constituted the basic requirements for the non-oil resistant Class R. In the present revision, resistance to change in hardness and tensile strength properties after oven aging has been retained as a basic requirement.

The former compression set requirement specified as Suffix "B" has been retained as part of the basic requirements and the values for Suffix "B" compression set as in last year's version require for their fulfillment the development of low set types of compounds.

Suffix Letter Changes

Another change has been in the suffix letter designations for low temperature requirements. Suffix "F" requiring low temperature test at —40 F. is now identified as Suffix "F_1," likewise Suffix "FF" requiring low temperature test at —65 F. is now Suffix "F_2."

In the tables for oil resistant Type S compounds, basic requirements formerly included hardness, tensile strength and elongation and the change in volume after aging in oil. In the revised specifications, change in volume in both high and low aniline point oils, change in tensile strength, elongation and hardness after aging in the air oven and compression set have been retained as basic requirements. Compression set under the Suffix "B" has been continued and requires the development of stocks especially compounded to have low compression set characteristics.

The table accompanying this article lists suffix letters designating additional quality requirements which have been provided so that the purchaser may specify requirements in addition to the basic requirements. These suffix requirements may be applied singly or in combination in further describing any grade. It will be seen that these suffix requirements provide the consumer great versatility in describing the specific requirements for a given rubber product.

While standard numerical limits and test methods have not been established for all the requirements denoted by suffix letters, it is the Committee's intention to provide this information at the earliest opportunity. Further work of the Committee will be directed toward even greater simplification of the specification which should result in making it even easier for the engineer to use.

Unique Testing Method

Denmark's few remaining full-time tramps have been offered employment commensurate with their detestation of work. A Copenhagen manufacturer of rubber soles has offered a position to five of these men to tramp around Denmark's coastline to test the soles. The weekly wage is about $30 to which is added a daily food allowance, the men will be required to cover about twenty miles a day, facing immediate dismissal in the event of shirking.

It is recognized that these specifications are being used by industries other than the automotive industry. It must be remembered, however, that these specifications are subject to revision when required by automotive needs and there is no assurance that the changes will be acceptable to all other users.

Offer Jasco, Inc., Stock

Sale of 50 percent of the outstanding capital stock of Jasco, Inc., has been offered by the U. S. Department of Justice. Jasco, Inc., was organized on a 50-50 basis by the Standard Oil Development Co. and I. G. Farbenindustrie, A.-G., before World War II as a parent holding company. Among the patents vested in the company are those concerned with the production of butadiene, styrene, butyl rubber, and other synthetics. The Farbenindustrie interests were seized by the United States during the war as alien property and it is this stock which is currently being offered to American nationals. Copies of the prospectus covering the stock offering, including financial statements of the company, a statement of terms and conditions, a questionnaire for prospective bidders, and the form of bid, may be secured from the Office of Alien Property, 346 Broadway, New York 13, N. Y. All bids must be sealed and received at that office no later than 3:00 P.M. on April 30.

Purecal SC Calcium Carbonate

A new coated ultrafine calcium carbonate for the rubber industry, "Purecal SC," is now commercially available, according to the Wyandotte Chemicals Corp., Wyandotte, Michigan. Purecal SC is made for easy dispersion without special handling, eliminates masterbatching and results in lowered costs and improved quality in cases where dispersion has been a problem. Even in GR-S rubbers, where ultrafine carbonates are generally satisfactory, material quality benefits are found when Purecal SC is substituted, the company maintains. Purecal SC's unique coating is believed to be the first coating offered commercially which does not retard the cure. Purecal SC gives essentially the same excellent properties heretofore attributed to the uncoated ultrafine carbonates, Wyandotte Chemicals claims.

INEDIBLE OILS FINDING USE AS PLASTICIZERS IN INDUSTRY

Specially treated inedible animal fats and vegetable oils are now being used as plasticizing agents in making vinyl plastic products such as garden hose, floor tile, drapes, tablecloths, table place mats, upholstery material and refrigerator gaskets, the U. S. Department of Agriculture recently revealed. Using the plasticizers developed by the department and manufactured by industrial concerns, these plastic products were on exhibit recently in St. Louis, Mo., at the 18th annual meeting of the National Farm Chemurgic Council.

This new industrial use for fats from hogs and cattle and vegetable oils from soybeans, results from a process developed from basic research at the Bureau of Agricultural and Industrial Chemistry's Eastern Regional Research Laboratory in Philadelphia.

Primary purpose of a plasticizer is to make an otherwise rigid and brittle material soft and flexible. Plasticizers from fats and oils do this, and in addition are especially valuable for chlorine-containing plastics, shielding them against discoloration and weakening caused by the hydrochloric acid formed when plastic is exposed to heat or sunlight, the department says, adding that, unlike other modifiers, such as lead and cadmium compounds, these new plasticizers do not make plastics opaque or hazy.

The method for processing fats and oils so they can be used as plasticizers is relatively simple, according to Dr. G. E. Hilbert, bureau chief. The acid portion of the fat is treated with hydrogen peroxide in such a way that a specially oxidized oil results. Such a process is cheap and practical and may be used with a wide variety of animal and vegetable fats and oils.

The new use for inedible animal fats represents a step in the department's battle to find uses for the acute surplus of these fats. Animal fats are by-products of the meat packing industry, and surpluses of them have been increasing. Mr. Hilbert says that the surplus in 1952 amounted to approximately 700 million pounds.

Three large industrial companies have been licensed under USDA patents to process fats and oils in this manner, and the new plasticizers are now available in tank car lots. There is a large potential market for plasticizers, more than 150 million pounds being required for the chlorine-containing plastics manufactured each year.

Characteristics of the specially oxidized fats and oils depend considerably on the starting materials. For example, vegetable oils so processed are superior in permanency, while animal fats have better blending qualities. Since the supply of plasticizers is low in wartime, modified fats and oils prepared by the new process from domestically available raw materials may relieve this shortage the department adds.

An index to Volume 72 of RUBBER AGE will be found on Pages 147 to 150 of this issue.

McDonald Joins Georgia Marble

Ernest C. McDonald, Jr.

Georgia Marble Co., Tate, Ga., has announced the appointment of Ernest C. McDonald, Jr., as head of the company's new Technical Service Laboratory. Mr. McDonald graduated from Kansas State College in 1940 and served in the U. S. Navy for three years during World War II. For the past two years he has been associated with the Eagle-Picher Co. at Joplin, Mo., where he was in charge of paint and varnish research. He also spent three years in lead and zinc pigment control for Eagle-Picher at Galena, Kans., and four years in the laboratories of the Devoe & Raynolds Co. at Louisville, Ky. The new technical service laboratory will take over and expand present quality controls to assure the finest wet and dry ground extenders, whitings, fillers and inerts for the rubber, plastics, paint and floor covering industries.

Stabelan HR Vinyl Stabilizer

Harwick Standard Chemical Co., Akron, Ohio, has introduced "Stabelan HR," a new stabilizer for polyvinyl chlorides and their copolymers. Stabelan HR is a synergized and chelated cadmium and barium compounded stabilizer. It is a heavy paste at 75° F., and becomes more fluid with increases in temperature. It is easily dispersed in dry pre-blends as well as in solutions and dispersions. To facilitate dispersion, Stabelan HR can be premixed with plasticizers before incorporation in dry pre-blend, the company states. The product is said to offer excellent heat resistance and to assure good light stability.

ASQC Plans 7th Convention

The American Society for Quality Control, New York, N. Y., has announced plans for its Seventh Annual Convention which will be held in Convention Hall in Philadelphia, Penna., on May 27, 28 and 29. A full program of papers and exhibits has been planned covering many industries. In addition, plant tours have been scheduled. An annual banquet and a social evening are also to be held. The Benjamin Franklin Hotel has been designated as convention headquarters.

LABOR NOTES

The United Rubber Workers, C.I.O., will seek a general wage increase to "better the standard of living of some 200,000 U.R.W. members" and will ask that pension agreements now in effect with the rubber industry be improved to "assist pensioners meet higher living costs." These objectives high-lighted a seven-point program outlined in Cleveland, Ohio, by L. S. Buckmaster, U.R.W. president, in the opening session of the union's International Policy Committee meeting on March 13.

On the wage question, the bulk of the rubber workers' contracts can be re-opened at any time on a 30-day notice. Pension agreements, under five year pacts signed in 1950, cannot be opened unless the various rubber firms agree to do so. "In view of radical changes that have taken place since 1950, Mr. Buckmaster stated, "these companies have a moral agreement to take a fresh look at these agreements."

Other suggestions listed by Mr. Buckmaster included the correction of intra-plant wage inequities; liberalization of fringe benefits; increased hospitalization and sickness and accident insurance; conclusion of the union shop campaign, and "investigation of the possibilities of negotiating guaranteed annual wage."

He told the nearly 200 local union officials it was absolutely vital that unions increase wages "if workers are to receive an adequate share of the national output in our expanding economy."

U.R.W. and the General Tire & Rubber Co. have signed a two-year agreement covering some 3,300 workers. The pact is similar to one reached several weeks ago with the Goodyear Tire & Rubber Co. It grants triple time for holiday work and two-week vacations after three years of employment.

A two-day strike against the nineteen plants of the U. S. Rubber Co. was settled on April 4. No details of the settlement were revealed by company spokesmen. About 35,000 employees were involved in the strike that had tied up plants in eleven states. Employees in eighteen of the plants went out on strike on the night of April 1. The strike became complete early on April 3, when they were joined by 3,000 employees of the Chicopee Falls, Mass., plant.

Both the union and the company refused to reveal the issues in the dispute other than to say that wages were not at stake. The settlement came after day-long talks in the Park Sheraton Hotel in New York City. The old contract expired at midnight on April 2, but was extended for 24 hours before the strike was called.

Gates to Build in Canada

Gates Rubber Co., Denver, Colo., has announced plans to build a manufacturing plant at Brantford, Ontario, Canada. Work was to have started on the plant in April with completion scheduled for fall. The plant will manufacture goods for the automotive, agricultural, oil and manufacturing industries.

Roth Rubber Promotes Jensen

Emil O. Jensen

Emil O. Jensen has been appointed vice-president in charge of sales for the Roth Rubber Co. of Chicago, Ill. Mr. Jensen came to Roth Rubber as general manager three years ago from Elkay Manufacturing. He is an active member of the Cicero Manufacturing Association, serving as secretary for four years, and other civic groups.

Firestone Tubeless Airplane Tire

The first main wheel tubeless airplane tire to be developed and designed for aircraft has been successfully flight tested at Patuxent, Maryland, Naval Air Test Center, according to officials of the Navy and of the Firestone Tire and Rubber Co. Designed by Firestone to reduce the weight of airplanes, the new tubeless tire uses nylon fabric and is 20% lighter in weight than the post-war rayon airplane tire and tube. Previous to the successful landing tests on a Navy SNB-5 the new type tubeless tire, developed specially for the Bureau of Aeronautics, had made 200 simulated landings in the Akron aircraft tire testing laboratory of the Firestone company. According to Raymond C. Firestone, vice-president in charge of research and development for Firestone, the time, money and space required by the military for purchasing, shipping and storage of tubes can be completely eliminated. Also the weight saving per airplane will range from 7 to 125 pounds, depending on the size and number of tires used. A large bomber requires nine large tires, the SNB-5 uses only three small-size tires.

Barrett Acquires Synvar Plant

The Barrett Division of the Allied Chemical & Dye Corp. has announced that it has acquired the Greensboro plant of Synvar Southern Corp. The plant comprises facilities for manufacture of urea-formaldehyde resins. Barrett stated that it would continue to make the same grades of resin as have heretofore been supplied by Synvar Southern Corp. to the furniture and textile industries. Barrett's extensive research facilities should assure better service to customers, company officials stated.

MANY SPECIAL FEATURES PLANNED FOR DIVISION MEETING AT BOSTON

As previously announced, Boston, oldest major city in the United States, capital city of Massachusetts and cultural center of the world, will be the site of the 63rd Meeting of the Division of Rubber Chemistry of the American Chemical Society. The meeting will be held from May 27 to 29, with headquarters at the Statler Hotel, and will not be held in conjunction with any meeting of the parent society. Abstracts of the papers to be presented at the technical sessions will be published in our next issue.

An unusual effort is being expended to make the Boston meeting one of the most memorable ever held by the Division and current plans give promise of great variety for both members, their wives and families. For instance, the committee-in-charge has planned tours of several leading manufacturing plants and has scheduled a visit to billion-dollar "Research Row" along the banks of the Charles River in Cambridge, world-renowned for its concentration of research institutions and industrial laboratories. Members can visit the Ford Motor plant in suburban Somerville, where they will watch the complete assembly of a Ford car. In Cambridge, they may inspect Dewey & Almy's control and research laboratory, the polymerization plant, and the model cannery where the application of can sealing compounds will be demonstrated. There will be other laboratory stops along the Row.

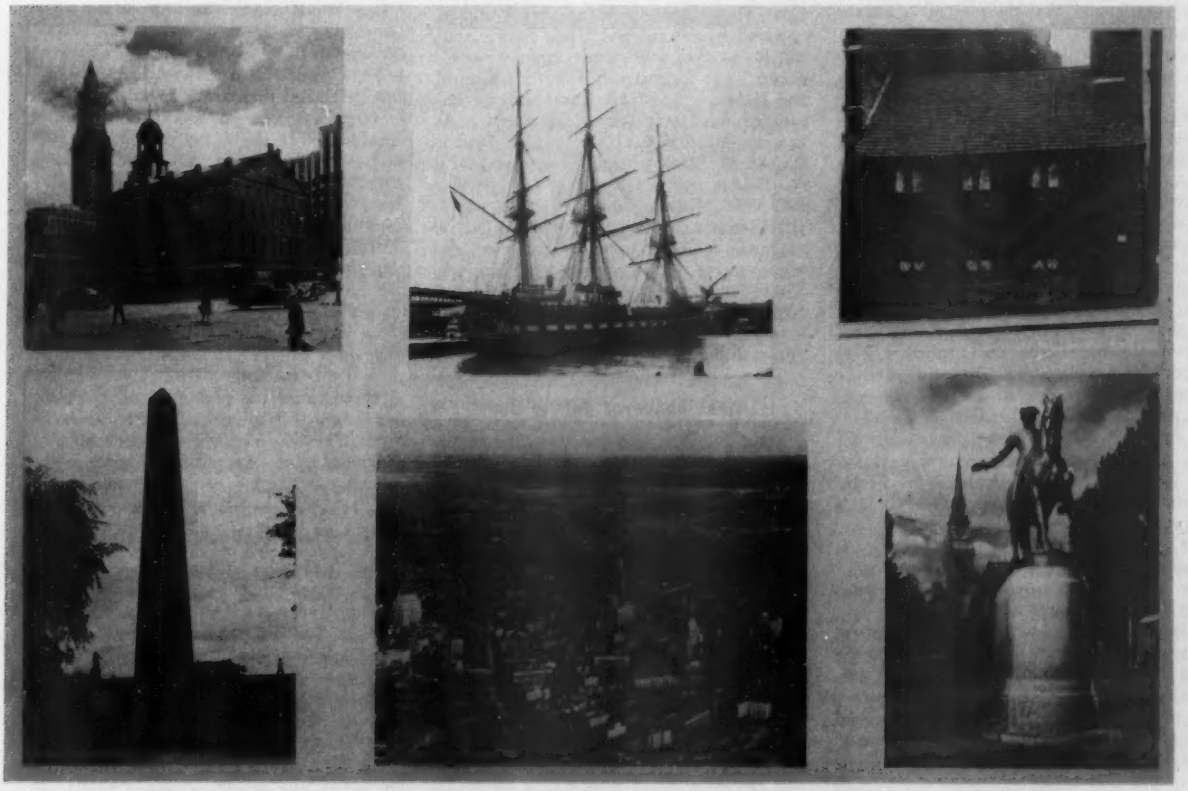
An opportunity will also be offered to inspect the new reclaiming plant of the Boston Woven Hose & Rubber Company, and the continuous vulcanizer and plastic extruder at the Simplex Wire and Cable Company plant, where a special high voltage demonstration is also planned for the benefit of visiting Division men. At the Hood Rubber Company in nearby Watertown, visitors may witness the entire process utilized in the manufacture of rubber footwear.

Another highlite of the meeting will take place on Wednesday night, when the Division will sponsor one of the nationally famous Boston "Pops" concerts, with Arthur Fiedler conducting. Symphony Hall, where the concert will be given, is arranged with tables seating five persons. Soft drinks, beer, champagne and other wines are served during the concert. Reservations for seats at the concert should be made as early as possible. Individual seats can be secured at $2.50 each, or a full table for five can be reserved at $12.50 per table. Reservations should be mailed to B. H. Capen, c/o Tyer Rubber Co., Andover, Mass., as soon as possible, with checks made payable to Mr. Capen. Other social activities will include a meeting of the 25-Year Club on Wednesday noon and the usual Divisional Banquet on Thursday evening. A special program is being arranged for the banquet.

There will be ample opportunity for visitors and guests to view Boston's many sites of historical, cultural, and educational interest. "The Hub of the Universe," as it is so aptly called, will be at its best in May, and everyone will be sure to enjoy Boston Garden, just a stone's throw from the hotel, with its rows of flower beds and its picturesque Swan Boats gliding gracefully across the lake. Boston's museums, its theaters, and its libraries will attract many, and all will want to view some of the many universities and colleges, including Harvard, Massachusetts Institute of Technology, Radcliffe, and Wellesley, that make Boston the educational center of America.

A special program has been planned for the ladies, beginning with a Boston "Get-Acquainted" Tea Party on Wednesday afternoon. Wives may wish to plan shopping tours of the exclusive shops in the surrounding Back Bay area, and in the large downtown department stores, a five-minute rapid transit trip from the hotel. On Thursday morning, by courtesy of Northeast Airlines, the women have been invited to enjoy a free airplane flight over Boston and the surrounding area.

For a closer view of some of Boston's famed historical sites, a guided bus tour is being offered on Thursday afternoon. The tour will stop first at the Old North Church, built in 1723, where Paul Revere's



Boston is a city steeped in American history and the photographs reproduced above depict some of the outstanding sites. TOP ROW (left to right): Faneuil Hall; U. S. Frigate "Constitution;" Paul Revere House. BOTTOM ROW (left to right): Bunker Hill Monument; Aerial View of City; Paul Revere Mall, with Old North Church in background.

signal lanterns, "one if by land and two if by sea," warned colonists of the coming of British troops in 1775. In the Charlestown Navy Yard they will view the United States Frigate Constitution, "Old Ironsides" to the scores of admirers of this staunch little vessel which engaged in more than forty encounters and never suffered defeat. From Bunker Hill Monument, which marks the site of the Battle of Bunker Hill, visitors will journey to Paul Revere's House, oldest frame house in the city and the residence of Paul Revere from 1770 to 1800. The tour will then proceed through the market district to Faneuil Hall, "Cradle of Liberty," still in use today with markets below and public meeting-halls above, its walls echoing the words of such great American patriots as Samuel Adams, John Hancock and James Otis.

There will be more than an hour in which to browse among the priceless treasures in the Isabella Stewart Gardner Museum, "Mrs. Jack Gardner's Palace" as it is known to many. Around the Venetian courtyard, the museum houses a distinguished collection of fine tapestries and paintings, and many valuable examples of sculpture, textiles, lace, furniture and of other fields of art.

For those who wish to stay on after the close of the convention, Boston has many vacation attractions. Few cities in the world offer so large a variety of opportunity for sports, recreation, entertainment and relaxation as does Boston. Outdoor activities invite the pleasure-seeker the year 'round, and the matchless attractions of beautiful New England's countryside are virtually at Boston's doorstep. In other spheres of entertainment Boston is also unsurpassed. The world-famous Boston Symphony Orchestra, the Boston Pops and the summer concerts on the Esplanade cater to what one of the nation's foremost magazines calls "the most discriminating musical taste in America." Boston is also one of the nation's foremost theatrical centers. Next to New York City, more first class theatrical productions are presented for the first time in Boston than in any other city.

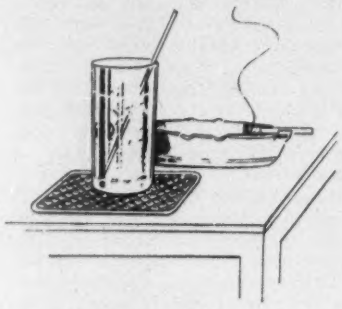
And Boston is a city of culinary delights. Lucius Beebe once called Locke-Ober's "a temple of gastronomy" when he sampled their blend of fine French and Down-East cuisine. Durgin & Park's is a 150-year old restaurant renowned for its delicious steaks and remembered for its informal, family-style atmosphere, complete with checkered tablecloths. Ye Olde Oyster House, famous for fine sea food for generations, and the Parker house, home of the famous Parker House "roll," are among the many outstanding restaurants in and around the city.

It should be obvious from the above that every effort is being spent to make the Boston meeting an outstanding one. Since the quality of the technical papers is expected to match the unusual social activities, attendance should be a "must" for all rubber technologists.

An index to Volume 72 of RUBBER AGE will be found on Pages 147 to 150 of this issue.

Rubbermaid Coasters Introduced

Wooster Rubber Co., Wooster, Ohio, has introduced a new line of "Rubbermaid Coasters," which have been adapted as miniatures of Rubbermaid Kar Rugs, the automotive throw-rug which the company



pioneered some years ago. Each coaster has a diamond-designed surface which collects condensed moisture and anchors the glass or cup resting on its surface. The coasters come in assorted colors of red, yellow, green and blue.

Synvar Announces New Line

Synvar Corp., Wilmington, Delaware, has entered the field of high impact phenolic molding compounds, and is bringing on the market compounds which are said to give an excellent molding performance, fast cure, superior surface, outstanding electrical properties and stability on storage. These compounds are being manufactured in natural and black color. Synvar is starting with three types of compound: (1) Synvar PM-88502, Natural and Synvar PM-88512, Black-with an impact of 0.6-1.0 ft lbs./in. of notch; (2) Synvar PM-88500, Natural and Synvar PM-88510, Black-with an impact of 1.0-2.0 ft. lbs./in. of notch; and (3) Synvar PM-88501, Natural and Synvar PM-88511, Black-with an impact of 2.0-3.0 ft. lbs./in. of notch. All these compounds meet the requirements of existing specifications. These new compounds will supplement Synvar's present line of general purpose, heat-resistant and improved impact phenolic molding compounds.

Giant Conveyor Belt in Use

What is said to be the world's longest, single-flight, rubber and fabric constructed conveyor belt has been put into operation between the coking plant and blast furnaces at U. S. Steel's new Fairless Works in Morrisville, Penna. Built by the Goodyear Tire & Rubber Co., the belt, measuring 5,500 feet from the center of the head pulley to the center of the tail pulley, is hauling quenched, sized and screened coke from the coke plant screening station to storage bins at the blast furnaces. The coke weighs 30 pounds a foot on the belt and registers temperatures of approximately 250 degrees Fahrenheit as it is being moved 300 feet per minute at a capacity rate of 400 tons per hour to the bins. The 11,000 feet of belting furnished by Goodyear is four feet wide and is constructed of especially compounded synthetic rubber and rayon fabric.

Entering Polyethylene Field

Monsanto Chemical Co. and the Spencer Chemical Co. both have announced plans for the construction of plants for the production of polyethylene. The site for the Monsanto unit has not as yet been disclosed but plans call for the production of 66,000,000 pounds of polyethylene annually. It is expected that the Monsanto unit will be in production early in 1955 with a 50% increase in capacity scheduled for 1957. Spencer Chemical's plans call for the construction of a plant to produce 45,000,000 pounds of polyethylene per year. The new plant will be located near Orange, Texas, where the company recently acquired a 400-acre site. The plant is expected to be in operation by the spring of 1955 and will employ approximately 250 people. The company also announced that a contract has been concluded with Imperial Chemical Industries, Ltd., of London, the holder of the basic patents on the polyethylene process. Through this agreement Imperial Chemical has licensed Spencer to operate under their patents, and will train Spencer personnel as well as assist in engineering design and contribute production know-how. Simultaneously, Spencer Chemical is entering into a long term ethylene purchase agreement with the Gulf Oil Corp., which will deliver ethylene to the new Spencer plant by pipeline from its refinery at Port Arthur.

Goodrich Pneumatic De-Icers

B. F. Goodrich Co. has introduced what are said to be the first pneumatic de-icers for use on high speed aircraft. The new de-icers consist of a network of small inflatable rubber tubes which expand enough to crack off ice, yet not enough to materially distort the shape of wing or tail surfaces. More than half a mile of the sensitive tubing is needed to protect airliners from ice forming on vital surfaces. The tiny tubes are imbedded in thin panels of rubber which are cemented to leading edges of the plane. Even at speeds above 300 miles per hour, the new de-icers remain flat against the surface. Made from rubberized nylon high-stretch fabric, the tiny tubes are only one-sixth the size of those used in earlier de-icers, yet operate at three times the pressure and complete the inflation-deflation cycle three times as fast. The new de-icers are electronically controlled and completely automatic in operation.

Plan Third Technology Conference

The Institution of the Rubber Industry has announced that the Third International Rubber Technology Conference will take place in London in June, 1954. Originally scheduled to be held this year, following the five-year cycle plan, it was postponed because of the coronation of Queen Elizabeth. Although the actual dates of the meeting have not been fixed, a Conference Executive Committee has been named to handle all the details. F. M. Panzetta is chairman of the committee which includes the following members: C. F. Flint, G. Gee, George Martin, L. Mullins, W. J. S. Naunton, J. R. Scott, and G. A. Shires.

HOLT DELIVERS INTERESTING TALK ON INTERNATIONAL RUBBER TRENDS

Everett G. Holt, rubber specialist in international affairs for the Rubber Division of the National Production Authority, delivered an interesting talk before the March 3rd meeting of the Akron Chapter of the American Marketing Association and the Sales Executive Club of Akron at the University Club in Akron, Ohio. The title of Mr. Holt's address was "Trends in the International Trade in Rubber."

Mr. Holt related some of his experiences with the Department of Commerce staring in the 1920's, when the Commodity Divisions (including rubber) were established by Secretary of Commerce Herbert Hoover. The Rubber Division's objective at first, he said, was to promote the export of rubber products. While the export of rubber products did rise, foreign governments began to impose barriers to imports such as high tariffs, marketing regulations, quotas, etc. The American companies, in turn, countered this trend by establishing or aiding in the establishment of foreign factories to service foreign markets.

This has been followed, he explained, by the foreign imposition of exchange controls and restrictions on remittances that today in many cases prevent or seriously hamper not only the repatriation of capital originally invested, but even the return to the United States of annual profits on the investment.

Mr. Holt then reviewed the effects of the British Rubber Restriction Scheme of 1922-28. The first reaction to this plan, said the speaker, was to stimulate production in areas not subject to restriction. Second, there was a great increase in the use of reclaimed rubber in the United States. Finally, research on synthetic rubber was stimulated. A definite economic program may be practical, he noted, but there are always offsetting factors to temper the original purposes. Always, he said, a price must be paid.

Mr. Holt also reviewed the plan which existed in 1934 to form a coalition of all rubber-producing nations in the Far East thereby controlling the market. While this scheme was more moderate than its predecessor, it had much the same aftermath.

World War II Problems

The next phase of Mr. Holt's address concerned itself with problems relating to the rubber supply shortly before and during World War II. He related his experience with the Rubber Development Corporation, and its efforts to obtain rubber from countries south of the Rio Grande River.

He also spoke of agreements and arrangements which presently exist with several Latin American governments in which the United States gives them technical assistance in the development of rubber plantations. In future years, he said, these agreements may become an important source of strength.

The second half of Mr. Holt's talk was devoted to the general postwar rubber situation. Mr. Holt noted that the production of natural rubber has not in any year been great enough to equal the consumption of new rubber. This means that the use of synthetic rubber to make up the deficit has become an economic necessity.

Second, the United States government and various other governments have established strategic stockpiles of natural rubber. This has served to remove from normal trade channels supplies of natural and thus increased the demand for synthetic.

Third, foreign countries, except Russia and Canada, use mainly natural rubber and only negligible quantities of synthetic. While they have no priority or claim on natural rubber supplies, their takings have the same effect as a priority. They can outbid us for rubber they need, because their individual purchases are so much smaller than ours.

Fourth, the United States can therefore import, at a price reasonably competitive with our synthetic, only the residue of natural rubber production minus foreign demand. The United States industry can buy only the residue of U. S. imports minus the quantity placed in the government strategic stockpile. Fifth, the industry has bought this residue and used it, and has used in addition as much synthetic rubber as was necessary to equal the demand for consumption in the U. S.

Sixth, since the end of the war, the use of natural rubber in foreign countries in the aggregate has shown a rising trend and is now approaching 1,000,000 tons. Seventh, world production of natural rubber in 1952 was 1,762,500 tons and this is not likely to increase much. Therefore, the quantity of natural rubber in excess of foreign demand will probably become smaller.

With these facts in mind, said Mr. Holt, is it not evident that our industry does not possess unlimited freedom of choice in its use of foreign materials? The amount of natural rubber it can obtain depends on foreign countries, how much is produced abroad and how much is consumed and stockpiled abroad. In the larger field of diplomatic relations, our government has freedom of choice only within the limits that friendly nations will support.

The speaker also discussed current attempts by the "working party" of the International Rubber Study Group to recommend measures that will prevent surpluses of natural rubber; and the present rubber picture as regards Ceylon and Red China.

Price as Supply Guide

Mr. Holt also pointed out that in trying to determine the relative supply of natural rubber and demand for GR-S the industry has apparently had a tendency to rely on the price of natural rubber too much, for guidance as to its near future availability. He said that price is not so good a guide as the statistics of world stocks of natural rubber.

It has been amply demonstrated in recent history that the total stocks of GR-S need to be the highest in this country when the production rate is lowest. The industry should, he declared, increase its stocks of GR-S in times when production is declining and particularly if world stocks of natural rubber are also declining. In his view, this stock carrying is a joint responsibility of the government and industry at present, and it may well remain so even if the GR-S plants are sold to private owners.

MARTIN RUBBER ANNOUNCES APPOINTMENT OF ANDERSON AND FEEHAN

Norman Anderson

James Feehan

Martin Rubber Co. of Long Branch, N. J., has announced that Norman Anderson, formerly associated with the Kentile Co., has joined the firm as chemist and production control engineer. It was also announced that James Feehan, previously associated with the Architectural Tile Co., has joined Martin Rubber as assistant plant supervisor in charge of time study and methods.

50th ANNUAL TOY FAIR ATTRACTS APPROXIMATELY 1200 EXHIBITORS

The 50th Annual Toy Fair held in New York City from March 9 to 18 attracted approximately 1200 exhibitors, many of them featuring lines of rubber and plastics. Auburn Rubber Corp. of Auburn, Ind., showed its line of molded rubber and vinyl tractors, autos, trucks and racers. A particularly interesting display was a replica of the Hotel New Yorker made entirely of Auburn building bricks.

Sun Rubber Co. of Barberton, Ohio, was also represented, showing its new line of rubber and vinyl dolls and inflated character toys. Seamless Rubber Co. showed a complete line of playballs, while Blake Industries showed its line of soft latex toys. Barr Rubber Co. and the Eagle Rubber Co. both showed complete lines of decorated play balls and colorful balloons in various shapes and sizes.

Dolls, of course, are a must at any Toy Fair, and the selection offered this year was by far the largest. Many of these featured latex and vinyl skins, some had foam-filled bodies, and all seemed to exhibit a high level of workmanship and life-like appearance.

Vinyl inflatables by many manufacturers were represented at this year's fair to a greater degree than heretofore. Play pools for example, were larger, sturdier and more colorful. Many featured rigid sides, seats, spray attachments and new hose connections. Vinyl beach toys were also much in evidence.

Bayshore Industries showed an interesting line of "sculptured" squeeze toys, as well as a line of rubber masks, rubber puppets and rubber "bendies", the wired-foam toys which can be bent into any position. Fli-Back Sales Corp. was represented with a group of sponge play balls as well as its perennial favorites, the paddle ball games.

Aktoy Manufacturing Co. presented a wide range of natural rubber toys, colored to delight the youngster, while the National Latex Products Co. showed a wide line of all types of rubber balloons. Other than all-rubber or vinyl toys, many metal, wood and rigid plastic units featured rubber tires, springs, hose, etc., which add to their utility and lifelike appearance.

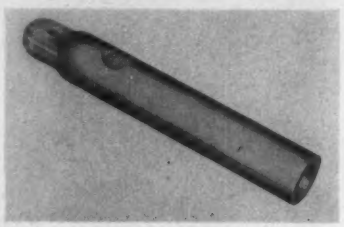
The general impression exists that rubber and vinyl continue to play an increasingly greater part in the production of toys and games. Polyethylene squeeze toys were also in evidence, indicating a larger interest in this material. In an over-all sense, the toys were more colorful, better designed and more carefully produced.

No. Calif. Holds March Meeting

The Northern California Rubber Group held its March 12th meeting at the Elks' Club in Berkeley, Calif. Speakers for the evening were P. C. Servais and R. Naegele of the Dow Corning Co. Mr. Servais spoke on the "Properties and Processing of Silastic," while Mr. Naegele spoke on the "Present and Potential Applications of Silicone Rubbers." Both talks were supplemented with numerous slides and samples. At the conclusion of the talks, a question and answer forum was held.

"Wise Jr." Marine Fender

Griffith Rubber Mills of Portland, Ore., has introduced the "Wise Jr.", an all rubber hollow cylinder marine fender for use with outboard motor boats, dinghies, and other small craft. Sturdy and long-lasting, yet lightweight, the Wise Jr. comes in a white finish that is nearly self-cleaning



and will not scratch nor mar the finest hull, the company states. The hollow rubber fender has an outside diameter of two inches and measures 12 inches, over-all length. Because of the special rubber formula which includes use of titanium, the Wise Jr. retains its brilliant white finish in either salt or fresh water.

"X-V" Vinyl Extruded Film

Extensive research on the "Blow-Extrusion" process has enabled the Plastics Division of the General Tire and Rubber Co. to start production of a new type of transparent vinyl film. This new polyvinyl chloride film product, now being manufactured at the company's Jeannette, Penna., plant, has unlimited potential for a variety of commercial and industrial applications, the company states. General Tire has selected the trade name of "X-V" for its extruded film. Blown in continuous sheets, the new "X-V" development is processed in both 36-inch and 72-inch sheets. It is available in seamless tube form or in folded single sheets. Outstanding features of "X-V" are its higher tear strength and light weight. It resists acid, flame, and grease, and will remain constant over a wide range of temperatures and humidities. "X-V's" qualities make it ideal for consumer packaging, container liners, raincoats, and a variety of other items. It is being produced in 101 different colors, and is available in gauges from .001 to .004.

Buys Phillips Electrical Works

British Insulated Callender's Cables, Ltd., of London, has bought the wire and cable business of Phillips Electrical Works, Ltd., a subsidiary of the Automatic Electric Co., Chicago, Ill. Included in the sale, for which no price was announced, are Phillips factories at Brockville, Ont., and Montreal. The British firm plans to continue the business and invest in it to the extent of $3,000,000 in the form of common stock. Phillips reported the sale will enable it to devote its future efforts exclusively to the making of communication and electrical control equipment, to be carried on under the name of Automatic Electric (Canada), Ltd. The company also is planning to erect a new factory in Brantford, Ont.

SCRAP RUBBER INSTITUTE HOLDS MEETING ON INDUSTRY PROBLEMS

The Scrap Rubber Institute of the National Association of Waste Material Dealers, Inc., held a panel discussion on "Problems of the Scrap Rubber Industry" in conjunction with the meeting of the parent association at the Conrad Hilton Hotel in Chicago, Ill., on March 16. The meeting also featured the election of officers for the 1953 season. Scrap Rubber Institute members elected to office included the following: *President,* Milton Kushkin (A. Schulman); *Vice-President,* Samuel Tanney (Tanney-Costello); *Secretary-Treasurer,* George W. Reid (NAWMD).

Panel members for the discussion on "Problems of the Scrap Rubber Industry," included Louis Fishman (L. Fishman), Ben Gordon (A. Schulman), John J. Costello (Tanney-Costello), and George Woloch (George Woloch). Henry M. Rose (Muehlstein) acted as moderator for the panel discussion.

Among the subjects discussed at the meeting were the new scrap specifications issued by the Rubber Reclaimers Association, Inc. A special committee was appointed to study the specifications and to take up any controversial features with the Institute as a whole. Also discussed at the meeting were industry conditions and the future outlook.

Named President of Ames Rubber

A. R. Ames, Jr. was recently elected president of Ames Rubber Corp., Hamburg, New Jersey, at a special meeting of the board of directors. Mr. Ames is a vice-president of the Ames Supply Co. and also technical director of Ames Research Laboratory. Mr. Ames attended Purdue University. He has been with the Ames Supply Co. since 1937. In 1939 he became assistant foreman of the Chicago Branch shop and in 1941 he was promoted to shop foreman. The next year he was elected a vice-president of the firm. Since the organization of Ames Rubber Corp. he has worked closely with the manufacturing and testing of platen compounds. In 1950, Ames Research Laboratory was established and Mr. Ames was appointed technical director to coordinate the work of Ames Rubber Corp. and Ames Research Laboratory. Last year he was one of the vice-chairmen of Ames Rubber Corp.

Preventing Migration and Bloom

Kenrich Corp., Maspeth, N. Y., has reported that a striking reduction in exudation has resulted from the use of Kenflex Resins in vinyl and rubber compounds. These resinous plasticizers and processing aids also serve as highly efficient coupling agents or mutual solvents, holding less compatible materials in the compound, thus preventing bloom and migration; permitting the use of less compatible extenders; markedly reducing loss of volatile ingredients; and simplifying incorporation of other polymeric plasticizers. These unique properties have been confirmed by users of Klenflex in various rubber and vinyl compounds, the company claims.

United Carbon Names Burnett

Dr. Waldo B. Burnett

Dr. Waldo B. Burnett, who for the past seven years has been director of the University of Wichita Foundation for Industrial Research, has been appointed technical director of United Carbon Company, Inc. Dr. Burnett, a native of Dallas, Texas, graduated from Dallas High School and subsequently earned his bachelor's degree from Southern Methodist University. He received his master's degree and doctorate from the University of Illinois. After graduation, he joined the staff of Mellon Institute in Pittsburgh, Penna., where he served first as industrial fellow. During this period, 1923-1939, he engaged in research on rubber accelerators, antioxidants, stearic acids, naval stores, gluconic acid, plastics and various aspects of rayon technology.

In 1939, Dr. Burnett joined the Tubize Rayon Corp. of Rome, Georgia, as assistant director of research and development. After progressing to director of research and development and to director of viscose operations, he left Tubize in November, 1945, to assume directorship of the University of Wichita Foundation for Industrial Research. Dr. Burnett is a past president of the Engineers Club of Wichita, the Technical Societies Council of Wichita, a former director of the Kansas Engineering Society and past president of the Wichita Civic Music Association. He is a registered professional engineer and also holds membership in the American Chemical Society, American Institute of Chemical Engineers, Society of Automotive Engineers, and other technical groups about the country.

Aeroquip Develops Jet Hose

A new type of high-temperature hose line for jet engines is being produced by Aeroquip Corp., Jackson, Mich., designer and manufacturer of flexible hose lines with detachable, reusable fittings for industrial and aircraft applications. The new anti-icing hose line, made of silicone rubber, is used on jet engines to convey hot air at temperatures up to 450 degrees Fahrenheit to prevent ice from forming on air intakes.

Carbon Black Packaging Formed

A new, non-profit group, Carbon Black Packaging, Inc., has been formed with headquarters at Bartlesville, Okla., for the purpose of developing an automatic packaging device for pelleted carbon black and the development of the most efficient and economical container for carbon black. The new organization was chartered in the State of Delaware on December 23, 1952. Financing of the development program will be accomplished from a fund contributed by the stockholders and available for expenditure during the five year term of the agreement. According to the new organization, in no event shall the stockholder's contribution be less than $1,000 per year and no more than $20,000 per year. Shares in Carbon Black Packaging, Inc., are now being offered for sale to individuals, companies or corporations. All contributions made to the organization will be used to meet expenses of the program. The stock in Carbon Black Packaging, Inc., is non-dividend bearing and will not in any case return to the owner more than the amount of cash originally contributed. Any devices or techniques developed may be used by a stockholder without further payment. Personnel required to carry on the program will be obtained through the employment of a research director and staff. Existing research institutes, laboratory facilities and manufacturing plants will be utilized to limit the investment of research funds in capital items. Inquiries should be addressed to Carbon Black Packaging, Inc., Box 1389, Bartlesville, Okla.

Barco Moving to Chicago Suburb

After 45 years in Chicago, F. N. Bard, president of the Barco Manufacturing Co., announced that all of the company's manufacturing and business operations are now being transferred to Barrington, Illinois, where Barco has erected a new, ultramodern 103,000 square foot plant at 500 N. Hough St. Long a prominent producer of railroad equipment and flexible joints for piping in industry, Barco, in more recent years, has broadened its line to include speed recorders for diesel locomotives, portable gasoline soil tampers (Rammers) and gasoline powered hammers for builders and contractors, and a new line of revolving joints for textile, paper, and other mill equipment.

Casein Vehicle for Latex Paint

American Resinous Chemicals Corp., Peabody, Mass., has announced a new development of special interest to manufacturers of latex paints. Providing excellent pigment wetting and dispersing properties, this new vehicle, called "Aquasperse No. 30" vastly simplifies the problems of latex paint manufacture, the company states. The pigment is mixed with casein and a paste formed which is then milled. Further compounding including the addition of the base latex then takes place.

Changes in perviously submitted questionnaires for the 1953-54 RUBBER RED BOOK will be accepted until May 1, 1953.

Weigold Named Factory Manager

Harold Weigold

Harold Weigold, formerly assistant factory manager of the Detroit plant of the Tire Division of the U. S. Rubber Co., has been named factory manager of the company's Chicopee Falls, Mass., plant, succeeding Thomas E. Clark, who has been appointed engineering consultant of the division. Mr. Clark had been factory manager at Chicopee Falls since 1943. Mr. Weigold joined U. S. Rubber in 1919, after being graduated from the Carnegie Institute of Technology. Prior to his becoming assistant factory manager at Detroit, he held a similar title at Charlotte and Eau Claire. A native of Holland, Mich., Mr. Weigand has also worked for the company at Providence and Hartford. In his new position, Mr. Clark will work with the company's five tire plant engineers on the most effective use of equipment. He started with U. S. Rubber in 1921, shortly after being graduated from the University of Illinois. Subsequently, he became factory manager at the Indianapolis tire plant, and at the Charlotte shell loading factory operated by the company during World War II.

French Society Appoints Nolan

The Union des Planteurs de Caoutchouc, with headquarters at Paris, France, has named Arthur Nolan, vice-president of Latex & Rubber, Inc., Baltimore, Md., as its representative in the United States. The French group represents the rubber planting industry of Indochina. The object in appointing an American representative was to establish closer ties between producer and consumer in all matters relating to natural rubber. Mr. Nolan maintains headquarters at 1075 Hull St., Baltimore 30, Md.

Dow Entering Polyethylene Field

Dow Chemical Co. is entering the production field of polyethylene, according to a recent announcement. Negotiations for patent licenses and technical knowledge have been made with Imperial Chemical Industries Ltd. Dow's Texas Division at Freeport will construct plant facilities and expects to start production of the plastic in 18-24 months.

FINANCIAL NEWS

Minnesota Mining & Mfg. Co.

For 1952: Net income of $16,089,995, which is equal to $1.96 per common share, compared with $15,738,452, or $1.92 a share, in the previous year. Net sales in 1952 were $185,241,760, against $170,067,527 in 1951. Net sales in 1952 reached an all-time high for the company. Total current assets as of December 31, 1952, totaled $87,903,501, contrasted with $86,640,132 at the end of the preceding year. Total current liabilities at the end of 1952 were $38,514,582 contrasted with $36,178,349 as of December 31, 1951.

Farrel-Birmingham Co.

For 1952: Net income of $1,712,158, which is equal to $5.27 a common share, on net sales of $32,567,492, compared with $1,418,275, or $4.36 a share, on sales of $25,498,754 in 1951. Total current assets as of December 31, 1952, totaled $5,436,187, while total current liabilities were $3,407,998. At the end of the previous year, total current assets were $4,870,199, while total current liabilities were $3,156,649.

Electric Auto-Lite Co.

For 1952: Net profit of $9,789,494, which is equal to $6.55 a share, compared with $11,162,093, or $7.47 a share, in 1951. The company explained that the decline in earnings was primarily due to the steel strike.

Canadian Industries, Ltd.

For 1952: Net profit of $10,752,768, which is equal to $1.48 a common share, compared with $11,526,625, or $1.59 a share, in the preceding year.

American Hard Rubber Co.

For 1952: Net income of $237,783, which is equal to 47c a common share, contrasted with $725,546, or $6.71 a share, in the previous year.

Belden Manufacturing Co.

For 1952: Net income of $975,799, which is equal to $3.04 a common share, compared with $1,161,576, or $3.62 a share, in 1951.

Canada Wire & Cable Co.

For 1952: Net income of $1,994,062, which is equal to $9.72 a common share, contrasted with $2,100,634, or $10.30 a share, in 1951.

Collyer Insulated Wire Co.

For 1952: Net income of $1,280,382, which is equal to $8.54 a common share, compared with $711,813, or $4.75 a share, in 1951.

United Engineering & Foundry Co.

For 1952: Net income of $3,772,906, which is equal to $1.51 per common share, compared with $3,845,710, or $1.54 a share, in 1951. Net sales in 1952 amounted to $85,097,554, contrasted with $67,388,758 in the previous year. Net working capital on December 31, 1952, was $13,287,694, against $12,359,368 on December 31, 1951.

Dayton Rubber Co.

Quarter Ended January 31: Net profit of $455,657, which is equal to 74c a share on the 586,767 shares of common stock outstanding. Since Dayton Rubber began reporting quarterly figures only in the third quarter of last year, no exact comparisons for the first quarter are available.

Detroit Gasket & Mfg. Co.

For 1952: Net profit of $997,452, which is equal to $1.90 a common share, against $1,251,998, or $2.39 a share, in 1951. Net sales in 1952 amounted to $27,128,069, compared with $28,892,719 in the previous year.

General Cable Corp.

For 1952: Net income of $5,283,230, which is equal to $2.38 a common share, compared with $5,506,949, or $2.46 a share, in 1951. The report pointed out that about 25% of the firm's business in 1952 was in connection with national defense.

Carlisle Corporation

For 1952: Net profit of $472,816, which is equal to $1.24 a common share on net sales of $13,302,767, compared with $605,722, or $1.60 a share, on net sales of $13,190,496 in 1951.

S. S. White Dental Mfg. Co.

For 1952: Net profit of $833,205, which is equal to $2.31 a share, compared with $1,095,885, or $3.13 a share, in 1951. Net sales in 1952 amounted to $21,335,908, against $20,988,835 the year before.

Jenkins Brothers

For 1952: Net income of $300,155, which is equal to $2.35 a common share, compared with $566,314, or $4.36 a share, in the previous year.

Allen Industries, Inc.

For 1952: Net profit of $1,041,942, which is equal to $1.86 a share, compared with $1,007,326, or $1.80 a share, in the preceding year.

Waiting for your copy of the 1953-54 RUBBER RED BOOK? Complete and return all questionnaires quickly!

Planning New Holland Plant

Construction of the 12th foreign plant of the General Tire & Rubber Co. will begin soon, according to a recent announcement by J. A. Andreoli, executive vice-president of the General Tire & Rubber Export Co. The plant will be located in Holland. Plans have been completed and engineers are on the job at the plant site in the West Haven area of Amsterdam. The excellent cooperation received from the Dutch government and Amsterdam municipal authorities was a big factor behind General's decision to locate a plant in Holland," Mr. Andreoli said. "This move is part of our foreign expansion program, which is geared to provide more accessible sources of supply for our customers in foreign countries," he added.

The plant is scheduled to be in operation before the end of the year, producing tires and tubes for automobiles, trucks, busses, airplanes, and farm equipment. General Tire's other foreign plants are located in Chile, Mexico, Venezuela, Brazil, Israel, Spain, Union of South Africa, and two each in Canada and Portugal. The company also maintains technical service affiliations with rubber manufacturing plants in Germany, Italy, and Switzerland.

Hewitt-Robins Inc.

For 1952: Net profit of $1,051,199, which is equal to $3.67 per capital share, compared with $1,038,219, or $3.73 a share, in 1951. Net sales in 1952 amounted to $37,364,512, against $36,307,105 in the previous year. As of December 31, 1952, total current assets were $15,506,901, against $13,495,755 at the end of 1951. Total current liabilities at the end of 1952 were $5,191,310, contrasted with $6,991,130 on December 31, 1951. Net working capital of the company increased from $6,504,625 at December 31, 1951, to $10,315,591 at the end of 1952, due largely to a $4,300,000 long-term loan.

Mohawk Rubber Co.

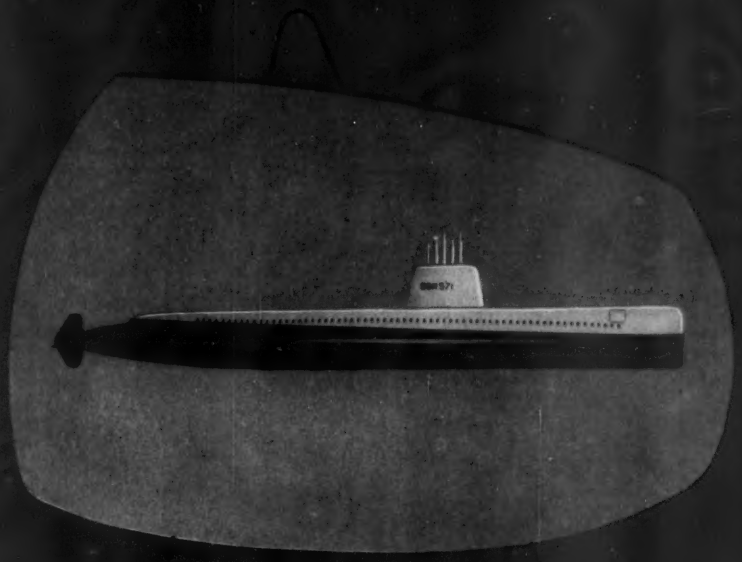
For 1952: Net profit of $683,658, compared with a net profit of $1,072,313 in 1951. Net sales in 1952 amounted to $19,189,795, contrasted with $20,884,078 in the previous year. As of December 31, 1952, the company reported total current assets of $5,425,592, and total current liabilities of $2,404,513. At the end of the previous year, total current assets were $6,843,031, and total current liabilities were $3,654,422.

Interchemical Corp.

For 1952: Net profit of $2,283,000, which is equal to $2.93 a common share on net sales of $88,188,000, compared with $2,349,000, or $3.02 a share, on net sales of $88,586,000 in 1951.

Thiokol Corp.

For 1952: Net income of $162,292, which is equal to 49c a common share, compared with $119,239, or 39c a share, in 1951. Net sales in 1952 totaled $7,669,158, against $4,841,627 in the preceding year.



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NEW RUBBER PRODUCTS

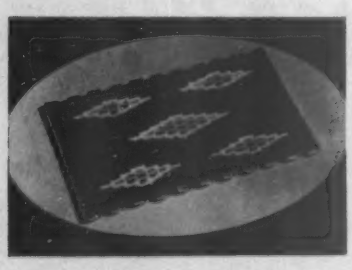
Wise Marine Fenders

Complete protection of a boat hull against hardest bumps, plus sparkling white permanent color are said to be features of the improved pneumatic "Wise Marine Fender" now being produced by Griffith Rubber Mills, Portland, Oregon. Lightweight and extremely durable, Wise Fenders are fully pneumatic thick-walled solid rubber fenders. They will float if dropped overboard and have a displacement ratio sufficient to act as emergency life preservers. A new development in the manufacturing process gives the Wise Fenders longer life and greater resiliency.

The manufacturer points out that the Wise pneumatic fenders give the same type of protection against bumps and shock that is given by the modern automobile tire. Retaining shape and buoyancy even after the heaviest knocks, the pneumatic fenders are practically self-cleaning because of the special rubber formula which contains titanium, a binding cohesive agent which resists dirt. Neither salt nor fresh water affects the fenders. Designed for both maximum protection and beauty, the double-eyed Wise Marine Fenders are available in three sizes: 3 inches by 12 inches Runabout, 4 inches by 16 inches Yacht, and 5 inches by 20 inches Utility.

GS Corrugated Rubber Matting

Corrugated mats made of especially compounded rubber links woven on 12 gauge spring steel wire, have been developed by the General Scientific Equipment Co., 2700 W. Huntington St., Philadelphia 32 Penna. Called "GS-Mats," they are particularly



adapted for use where moisture, oils, animal fats, acids, chemicals, solvents and abrasives are apt to be on the floor. The company states that they are easy to clean and handle.

Soft Asbestos-Neoprene Gasket

A new gasket material, "Asbestoprene," developed from asbestos and neoprene by the Victor Manufacturing and Gasket Co., Chicago, Ill. is unusual in that it combines compressibility with heat resistance. Asbestoprene is made on modified paper-making machines where the neoprene can be added in latex form to asbestos pulp. This method of combining the two materials was made possible by the recent DuPont development of a special neoprene latex suitable for addition to paper pulp to make wet strength paper. Victor found the new latex could be used with asbestos substituted for paper pulp. Physical properties of Asbestoprene are as follows: Tensile strength: 1500 psi. minimum in the machine direction, 500 psi. minimum in the cross-machine direction. Mullen burst strength: 130 pound per 1/16-inch gauge. Compressibility: 20-30% at a loading of 1,000 psi. Recovery: 40% minimum. Hardness: 70± 10 Shore Durometer A. Flexibility: a 1/16-inch sheet can be bent around a 1/32-inch mandrel without cracking. Oil resistance: 90% minimum retention of tensile strength, and 5% maximum thickness change, after a 5 hour immersion at 300° F. in ASTM No. 1. test oil. Gasoline resistance: 0 to +5% thickness change after 5 hour immersion at 70° F. in ASTM No. 1 reference fuel.

"Mar-Not" Gas Pump Nozzle

A flexible rubber gasoline pump nozzle called "Mar-Not" has been introduced by the Goodyear Tire & Rubber Co. No metal parts of the nozzle can come in contact with a car while it is being filled with

gasoline. The rubber nozzle is leak-proof and is not affected by gasoline, benzol or other petroleum products. Sunproof and weather-resistant, it will not crack, lessens resistance to gas flow, and will not break because of flexing, the company states.

Changes in previously submitted questionnaires for the 1953-54 RUBBER RED BOOK will be accepted until May 1, 1953.

Goodyear Fabric Sphere

Research engineers at the Goodyear Tire & Rubber Co. have designed a sphere which can be carried through space in an Aerobee rocket for a distance of approximately 80 miles. Designed for the Army Signal Corps for use in measuring atmospheric conditions and long range communications, the sphere makes it possible to carry on weather experiments during daylight hours, in overcast skies and in faster ground winds. A recent change in the make-up of the sphere involves two-ply nylon fabric processed with a nylon

coating which takes the place of impregnated neoprene. The sphere is only fifteen thousandths of an inch thick. During flight, the sphere is carried near the nose of the rocket. As it reaches the peak of its flight, an electronic impulse blasts the cone portion of the rocket away. This automatically releases the sphere, which is inflated by a cylinder pressurized within the sphere. The sphere, after its release from the rocket, can be tracked by the use of powerful telescopes after its fall reaches a certain height thus enabling meteorologists to follow the sphere by vision as well as by electronic equipment to the ground.

King Neptune Swim Fins

Martin Rubber Co. of Long Branch, N. J., has introduced a new line of swimming accessories, including "King Neptune" swim fins, shown below, and "King Neptune" swim masks. Made of pure gum

rubber in an attractive sea green color, these swimming accessories are designed for both old and young. The swim fins are adjustable to fit all sizes. The goggles are made of unbreakable glass and protect the swimmer's eyes and hose.

Bakelite Co. has announced that a new plant for the expanded production of Bakelite fluorothene resins is now under construction at South Charleston, W. Va.

Solve Your Die Problems

in
Plastic, Aluminum and Zamak

Injection Molded parts of all shapes and sizes for all kinds of uses need Dies that will give you continuous production. We have the know how, because we build, as well as constantly use, Dies of our own manufacture to produce Aluminum and Zamak parts.

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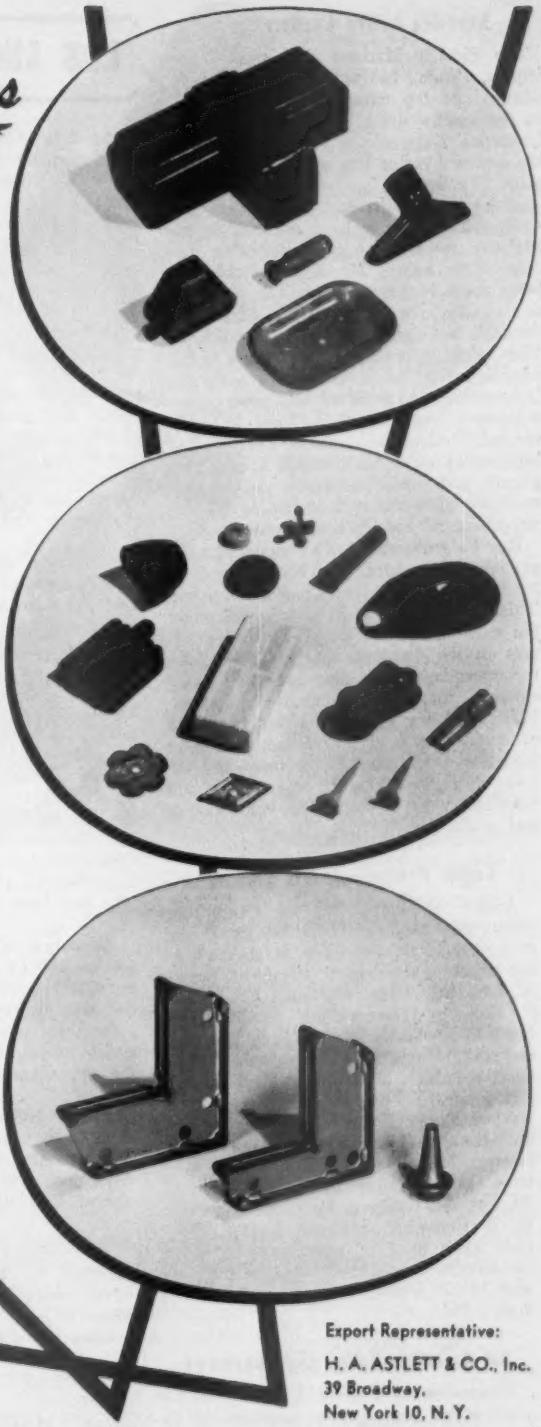

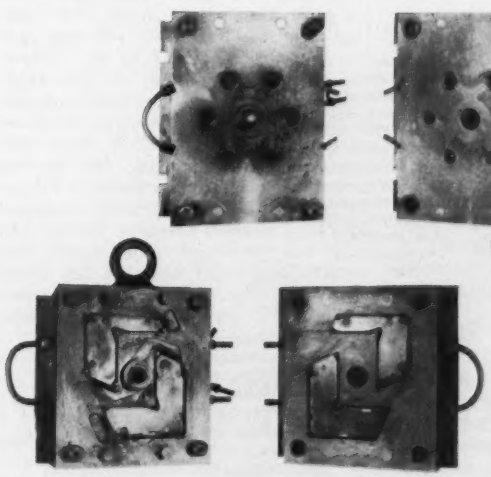

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FORMS	MOLDS	DIES	MACHINERY
LATEX - DIPPING	STEEL AND ALUMINUM	PLASTIC - INJECTION	SPECIAL - AUTOMATIC

Assumes Active Leadership

The Fidelity Machine Co., Inc., Philadelphia, Penna., has announced a realignment of its top executive staff to speed its expansion drive into new markets. Lawrence Katz, chairman of the board, has assumed active leadership of the company. Though he has headed the Fidelity organization for the past seven years, his work until now has been confined to an advisory rather than a participating nature. The change, Mr. Katz indicated, is being made because of Fidelity's need for day to day coordination of its expanding domestic and foreign activities. Joseph P. Vogt, Fidelity president, in addition to his administrative duties as general manager, is assuming charge of all new product development and engineering, and a newly created Product Development Division has been set up under his direction to seek new patents and inventions which can be successfully marketed and to handle the development of Fidelity's own products.

Roy Faigenbaum, newly announced vice-president for sales, has been named to head the Market Development Division. This division, it was indicated, will study the existing application of Fidelity products in the domestic markets and make recommendations of new uses and fields suitable for the company's equipment. Robert Scholes, as vice-president in charge of engineering and production, will have complete supervision of the plant and the constant improvement of engineering and manufacturing methods for both quality and production.

Angier Products Elects Officers

Angier Products, Inc. of Cambridge, Mass., has announced that at its annual meeting held on February 20, the following officers were elected: *President,* Henry S. Bothfeld; *Vice-Presidents,* Dr. Joseph F. Manning (research and development), Norman L. Melbye (purchasing and production), Harrison F. Rowbotham (industrial sales), and Elwyn H. Kittredge (shoe sales); *Treasurer,* G. Storer Baldwin; *Assistant Treasurer,* Charles R. Pinkul; *Comptroller,* George Beasley; *Clerk,* George M. Naylor, Jr. The following were elected as directors: Mrs. Helen G. Angier, Mr. Baldwin, Mr. Bothfeld, Peter H. B. Cumming, and Mr. Naylor. Company sales in 1952 were reported to be the largest in the history of the company with bright prospects for continued growth during 1953.

3M Promotes Kelley and Fuhrmann

Promotion of Charles A. Kelley to the position of general sales manager of its Adhesives and Coatings Division was announced recently by the Minnesota Mining and Manufacturing Co. Mr. Kelley previously served as division sales manager for the automobile industry. He has been a member of the 3M sales staff since 1940. In his new position, Mr. Kelley will continue to headquarter in the firm's Detroit office. The Adhesives and Coatings Division also recently named Alvin O. Fuhrmann as sales manager for industrial and distributor trades with headquarters in Detroit.

LOS ANGELES NEWS

The Los Angeles Rubber Group has made available its "TLARGI Yearbook" for 1953. Volume XII in the series, the new edition provides a complete recapitulation of the group's activities throughout the past year, offers a listing of current members and a listing of supplies to the rubber industry in the Los Angeles area. Also provided is a listing of rubber manufacturers on the Pacific Coast. The yearbook also features abstracts of all the papers presented at the technical sessions of meetings held throughout the year. The yearbook is illustrated with photographs depicting the group's activities during 1952. Copies may be obtained by writing the Chairman, Yearbook Committee, Los Angeles Rubber Group, Inc., c/o Statler Hotel, Los Angeles 17, Calif.

According to a recent announcement, an expansion program now in progress at the Los Angeles plant of the B. F. Goodrich Co. may result in a 20% increase in daily tire production.

Tilbert Reynolds, formerly chief chemist of the Stoner Rubber Co. at Anaheim, Calif. has been elected a vice-president of the company.

L. E. Forrest, formerly associated with the England and Luxembourg plant of the Goodyear Tire & Rubber Co., has been named purchasing agent of the firm's Los Angeles plant succeeding J. Gibson, who has been transferred to Akron.

Arrowhead Rubber Co., Downey, Calif., has announced plans to expand its plant by 20,000 square feet. It is expected that the new project will be completed within some three months time. It is also planned to employ 100 additional persons when the expansion program is completed.

S & G Rubber Co. reports that it will soon be back in full production. The plant had been shut down for approximately 30 days due to a fire which had destroyed almost half of the company's facilities.

The technical session of the April 8th meeting of the Los Angeles Rubber Group was to have been held at the Statler Hotel in Los Angeles. J. S. Buehler, chief chemist at the Torrance synthetic rubber plant operated for the government by the Midland Rubber Corp., was scheduled to address the group on "Recent Developments in GR-S." A full report on this meeting will appear in a future issue of RUBBER AGE.

Newark Rubber Washing Formed

Newark Rubber Washing Co., Inc., has been formed at 369 South Street, Newark, N. J., specializing in the washing and drying of all grades of crude rubber, balatas, gums and allied products. Paul Kohlman has been named general director of the new concern. The telephone number is Mitchell 2-5263.

Japanese Team Touring U. S.

An 11-man delegation from Japan is presently touring rubber producing facilities in the United States in a visit arranged by the Reconstruction Finance Corporation. The delegation, consisting of 10 men from the Japanese rubber industry and one banker, are members of the Synthetic Rubber Manufacturing Project Committee of Tokyo. The visitors are especially interested in the technical and construction phases of synthetic facilities. The group disclosed that Japan is planning the construction of a synthetic plant with a capacity of 36,000 tons annually. Their intention, they explained, is to produce a rubber similar to GR-S. The styrene would be made from alcohol derived from sweet potatoes, a major crop in Japan. During the latter part of March, the Japanese delegation visited the Akron facilities of General Tire, Firestone, Goodrich and Goodyear. They then left for Louisville, Ky., and after that were scheduled to go to more than a dozen other cities in addition to Sarnia, Ont., Canada. Dr. Shu Kambara, director of the Polymer Research Institute of Japan, and who completed a year of lectures and study at the University of Akron on April 1, is accompanying the group.

Personnel Shifts at Emery

Emery Industries, Inc., Cincinnati, Ohio, has announced several changes in its chemical sales staff. J. P. Clancy has been transferred from the southern area to New England. He will join J. M. Washburn in the responsibility for sales of all Emery products, including fatty acids and derivatives, Plastolein Plasticizers and Twitchell Textile Oils, in the New England area. C. T. Burgess will take over the sales duties vacated by Mr. Clancy, which involves the states of Mississippi, Alabama, Georgia and the eastern section of the state of Tennessee. Two additional men, E. L. Spencer and E. W. Sack, were appointed to the sales staff. Mr. Spencer, a chemical engineering graduate of Princeton University, was formerly associated with the Cincinnati Chemical Works. Mr. Sack was transferred from Emery's Production Department where he has served as a department supervisor for the past eleven years. Both will assume field sales responsibility in the near future.

Dayton Nu-Ride Service

Dayton Rubber Co. has introduced a new service known as the Dayton Nu-Ride Service which utilizes a series of newly-developed machines and adjustments applicable to all wheel and tire assemblies. The new service, according to the company, not only balances the vehicle's wheel and tire assemblies, but incorporates a device which permits tires to be made truly circular. Company officials explained that tires, upon leaving the mold, have a tendency to become slightly out-of-round because of the uneven flexibility characteristics of rubber and fabric. This eventually cuts down on tire life and makes for steering wheel vibration and a bumpy ride. The new service is guaranteed to eliminate this bumping and thumping.

THE HISTORY OF THE RUBBER INDUSTRY—No. 2

how long did it take to get from here to here?

Answer: Seven years.

It is reported that natives, in areas where tree rubber was first available, made the first shoes and shoe soles of natural rubber. Rubber-soled shoes are said to have been developed for use in this country around 1898, in Boston, where strips of rubber were nailed onto the shoes of firemen.

By 1905, seven years later, rubber heels and rubber shoe soles were being produced commercially in the United States. Monsanto Chemical Company was founded during this same period, in 1901, and has since become a leader in rubber chemicals research.

Santocure, for example, is an effective mercapto accelerator developed by Monsanto. It gives excellent results in natural, reclaimed and synthetic rubbers. Santocure is also exceptionally safe at processing temperatures but powerful at curing temperatures. For complete information write for booklet "Monsanto Chemicals for the Rubber Industry" or contact MONSANTO CHEMICAL COMPANY, Rubber Chemical Sales, 920 Brown Street, Akron 11, Ohio.

MONSANTO CHEMICALS FOR THE RUBBER INDUSTRY

ANTIOXIDANTS

Flectol* H
Santoflex* B
Santoflex BX
Santoflex 35
Santoflex AW
Santowhite* Crystals
Santowhite MK
Santowhite L

ALDEHYDE AMINE ACCELERATORS

A-32
A-100

MERCAPTO ACCELERATORS

Santocure*
El-Sixty*
Ureka* Base
Mertax (Purified Thiotax)
Thiotax (2-Mercapto benzothiazole)
Thiofide* (2,2' dithio-bis benzothiazole)

GUANIDINE ACCELERATORS

Diphenylguanidine (D. P. G.)
Guantal*

ULTRA ACCELERATORS FOR LATEX, ETC.

R-2 Crystals
Pip-Pip
Thiurad* (Tetramethyl-thiuram disulfide)
Ethyl Thiurad (Tetraethyl-thiuram disulfide)
Mono Thiurad (Tetra-methylthiuram mono-sulfide)
Methasan* (Zinc salt of dimethyl dithiocarbamic acid)
Ethasan* (Zinc salt of di-ethyl dithiocarbamic acid)
Butasan* (Zinc salt of di-butyl dithiocarbamic acid)

WETTING AGENTS AND DETERGENTS

Areskap* 50
Aresklene* 375
Santomerse* S
Santomerse D

SPECIAL MATERIALS

Thiocarbanilide ("A-1")
Santovar*-A
Santovar-O
Sulfasan R
Insoluble Sulfur "60"
Retarder ASA

COLORS

DEODORANTS

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS—PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

CANADIAN NEWS

Rt. Hon. C. D. Howe, minister of defense production for Canada, reported recently that the Polymer Corp., Ltd., Sarnia, Ont., had a net profit of $2,798,481 for nine months, after providing $3,806,499 for depreciation and $3,005,000 for income tax. Mr. Howe tabled the annual report of the corporation in the Commons and pointed out that it covered only the nine-month-period because of the change in Polymer's fiscal year to the calendar year to comply with the Financial Administration Act of 1951.

Regular quarter dividends totaling $1,500,000 were paid to the Federal treasury and an extra dividend of $1,000,000 was declared at the end of the year. In addition, $1,000,000 of outstanding debentures were retired. Re-arrangement of the company's financial structure, together with the decision that crown corporations should pay income tax, enabled the company to develop its business on a basis similar to that of other industry, the report stated.

The report showed that production and sales were at the highest rate in history. Profits on the other hand, before taxes were at a rate of eight per cent below last year because of lower prices on standard grades of rubber, substantially lower sales of chemicals and higher payroll costs.

Polymer, the report said, now was meeting all demands for its synthetic rubbers in the domestic market. These demands amounted to 50 per cent of the primary rubber consumed. In addition, the company made a substantial contribution to Canada's trade with export sales amounting to about $20,000,000 a year.

Mr. Howe emphasized that the corporation never had had a penny of public funds since the original construction program and that the cost of all expansions had been met out of earnings. It was now a well-established industry with its products being essential for many manufactured items. Polymer has an aggressive research policy on both processes and products and it was expected that in the years ahead the industry would continue to expand.

The company president, J. D. Barrington, reported that generally the plant had a good business year in 1952 and expected a "profitable" year in 1953. The world demand for rubber continued to climb and he predicted that consumption soon will tax the productive capacity for natural and synthetic.

"Natural rubber production can only be increased at a graduate rate and it therefore will fall to the synthetic rubber industry to take care of the greater part of this expansion," he said. With this big world demand, many countries were showing renewed interest in building synthetic plants of their own, but only Germany was expected to build a plant this year, and this will not affect Canada's European sales, said Mr. Barrington, until about 1955.

A big question-mark was the decision of the United States Government to dispose of its own synthetic plants to private industry. Congress was expected to get disposal plans this year. Mr. Barrington said he was awaiting the outcome with "considerable interest" but he did not believe the actual disposal will take place before 1954.

P. H. Delacour

named vice-president in charge of sales for Cabot Carbon of Canada

The $2,798,481 net profit for the nine months of 1952 compared with $8,375,786 for the 12 months of the fiscal year ended March 31, 1952. But that latter figure did not include income tax payments. Crown companies only started paying taxes last April.

The $66,000,000 plant, which feeds chemicals into neighboring Sarnia industries, underwent a big expansion in 1951. Production of all rubber types in the nine months of 1952 jumped 8.5% to about 90,000 pounds from 80,000,000 in the comparable previous nine months. Production of such chemicals as ethylene and styrene, however, dropped 12.5 per cent to about 41,000,000 pounds from about 68,000,000 because of lower demand.

Cabot Carbon of Canada, Ltd., Canadian subsidiary of Godfrey L. Cabot, Inc., has announced the appointment of P. H. Delacour as vice-president in charge of sales. F. Ronald Gorrie was appointed assistant sales manager. Prior to the establishment and operation of the Cabot subsidiary company in Canada, the firm of Delacour-Gorrie Ltd., of Toronto, directed by P. H. Delacour, president, and F. R. Gorrie, vice-president, represented exclusive sales of all Cabot products in Canada. In January, 1953, Godfrey L. Cabot, Inc., announced the joining of Delacour-Gorrie with Cabot Carbon of Canada, including all personnel of the former company. It was also announced that Cabot Carbon of Canada would represent sales for Canadian-produced Cabot oil furnace rubber blacks, and all types of carbon black, pine products, plasticizers, and other products of Godfrey L. Cabot, Inc. Production facilities are at Sarnia, Ontario, and offices are located at Montreal and Toronto, Canada. Mr. Delacour's activities have been related to the sale of Cabot products in Canada for the past twenty-five years. Before the formation of Delacour-Gorrie, he was a director of Harrisons & Crosfield (Canada), Ltd.

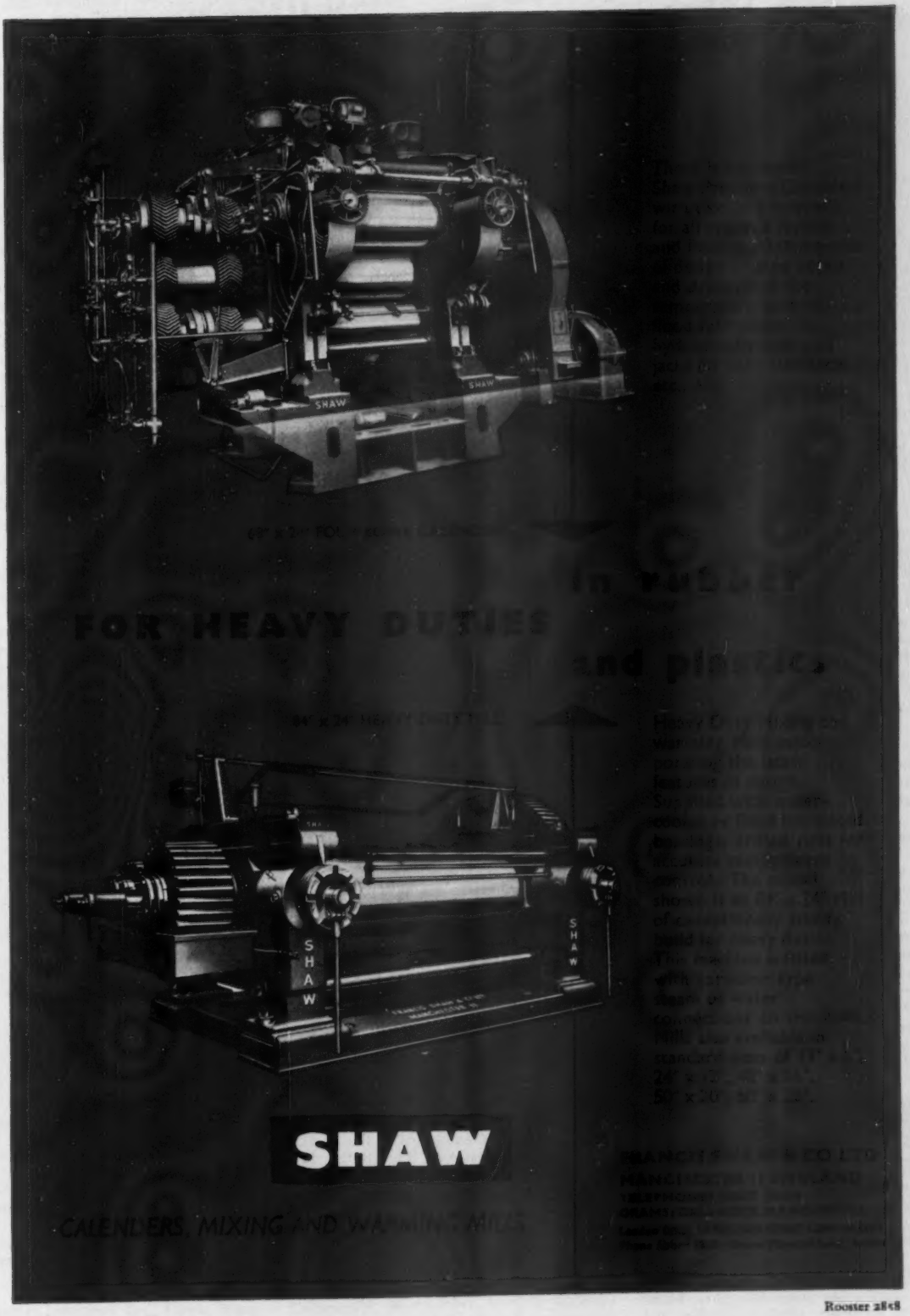
Sales of plastic products in Canada and the United States will triple in volume by 1960 with the greatest advance to be noted in the field of plastic materials for structural use, according to Dr. Frank K. Schoenfeld, vice-president, technical, of the B. F. Goodrich Chemical Co., Cleveland, Ohio. Speaking at the annual meeting of the Society of Plastics Industry of Canada, Dr. Schoenfeld forecast that Canada will play a role of increasing importance in plastics manufacture. He pictured Canada's economy as "dynamic, providing opportunities for intelligent merchandising."

Dr. Schoenfeld described plastics as the most versatile structural materials known and said that they are already beginning to invade the structural material field, competing with lumber, glass, light metals, ceramics, iron and steel in many applications. "Today, plastics can be combined with or can replace textiles, rubber and leather to increase the personal living comfort of the average man," Dr. Schoenfeld said. "They are broadly used in industry as adhesives for plywood, as the base for the newest types of paints, as the raw materials for synthetic textile fibers and textile treating agents, as paper and leather treating agents, as agricultural aids and even as medicinals."

The greatest single need of the plastics industry, according to Dr. Schoenfeld, is a speed-up in the development of plastic fabrication technique. He said that no other technical factor is as important if the present growth rates in the use of plastic products are to continue.

Discussing the immediate economic climate within which he foresees expansion of the Canadian plastics industry, Dr. Schoenfeld said that conservative estimates indicate an increase of 20 percent in Canada's population during the 1950s. He said that with Canada's abundant natural resources, technical facilities and production know-how, this population growth will stimulate the economy. The Goodrich Chemical executive cautioned the plastics industry, both in the United States and Canada, to use intelligence in introducing plastics into new fields and to carefully maintain product quality. Otherwise, Dr. Schoenfeld said, the new markets now beckoning to plastics will vanish.

Five of Canada's major rubber companies have pleaded innocent to a charge of operating a combine in restraint of trade. The trial, expected to last four to six weeks, will begin on April 7 in Ontario. Charged under the criminal code were the Goodyear Tire & Rubber Co. of Canada, Ltd., Dominion Rubber Co., Ltd., Dunlop Tire & Rubber Goods Co., Ltd., Gutta Percha & Rubber, Ltd., and the B. F. Goodrich Rubber Co. of Canada, Ltd.



Rooster 2858

OBITUARIES

Emory Ward Stearns

Emory Ward Stearns, formerly president, chairman of the board and director of Parker-Stearns & Co., Inc., Brooklyn, New York, died on March 19 at his home in Floral Park, L. I., N. Y. He was 73 years old. Born on July 23, 1879, in Brooklyn, Mr. Stearns was graduated from Cornell University in 1902. He joined the company in 1906 and rose to the office of the president, later becoming chairman of the board. He was a member of the Rubber Manufacturers Association and the Kiwanis Club in Brooklyn. He was also the former owner of the Lake Spofford Hotel, Spofford, N. H. Funeral services were held at the Roslyn Presbyterian Church on March 21, with interment in Nassau Knolls, Port Washington, L. I., N. Y. Mr. Stearns is survived by his wife, two sons, two daughters and ten grandchildren.

Harry L. Mahoney

Harry L. Mahoney, advertising and sales promotion manager, of the Mansfield Tire & Rubber Co., Mansfield, Ohio, died on March 15, after an illness of several months. He was 49 years old. He became associated with the Mansfield organization on May 5, 1947. Previously he was advertising and sales promotion manager of the Associated Lines division of the B. F. Goodrich Co. and prior to that was associated with the Seiberling Rubber Co., and the Goodyear Tire and Rubber Co. A native of Akron, Mr. Mahoney was one of the organizers of the Mansfield Advertising Club and a member of its board of directors at the time of his death. Funeral services were conducted in Mansfield on March 17 and interment was at Mt. Herman, Mass. He is survived by his wife and two daughters.

Henry H. Robinson

Henry H. Robinson, co-founder of the National Electric Products Corp., Pittsburgh, Penna., died at his home in Sewickley Heights, Penna., on January 9. He was 79 years old. Mr. Robinson retired from active service with the company two years ago. A graduate of Yale University, Mr. Robinson spent most of his industrial career with the company he founded in 1905 with his brother, W. C. Robinson. The firm grew to be one of the nation's largest manufacturers of electrical wiring products. The company's main plant is at Ambridge, Penna., and a new plant was recently opened in New Jersey. He leaves his brother, W. C. Robinson, who is president and chairman of the board of the company.

Raybestos-Manhattan, Inc., has moved its Chicago office from 445 Lake Shore Drive to its newly constructed office and warehouse building at 6010 Northwest Highway.

John C. Holmes

John Colburn Holmes, former partner in Fred Waterhouse, Inc., New York rubber brokerage firm, died reecntly in Franklin, N. H. He was 60 years old. A graduate of Dartmouth College, Mr. Holmes had also been employed by the Goodyear Tire & Rubber Co. during his career in the rubber industry. While with the Waterhouse concern, he served in London and New York. He also held executive posts with the Franklin Hospital Association, the Farm Extension Branch of the University of New Hampshire and the Franklin Savings Bank. Funeral services were held on March 29 at his home in Franklin, with interment in that city.

Dayton Promotes Mayle and Kem

Paul J. Mayle, former comptroller of the Dayton Rubber Co., Dayton, Ohio, has been named vice-president and assistant secretary, while Myron S. Kem, formerly chief accountant, has been promoted to comptroller and assistant secretary. Mr. Mayle will be responsible for the administration of financial operation of the company, including budget administration, while Mr. Kem will handle all accounting procedures, including internal audits and controls. Mr. Mayle has been with Dayton Rubber since 1935. He formerly was secretary-treasurer of the McClaren Rubber Co., Charlotte, N. C. Mr. Mayle attended the School of Business at Columbia University and is a charter member of the Dayton chapter of the Comptrollers Institute of America and a member of the National Association of Cost Accountants. Mr. Kem came from Wall, Cassel and Croneweg, a Dayton public accounting firm, in 1937. He was graduated from Ohio State University and took post-graduate work at the University of Chicago. He is a member of the Ohio Society of Certified Public Accountants, the American Institute of Accountants, the National Association of Cost Accountants and the Institute of Internal Auditors.

Cuthbertson Promotion Announced

G. R. Cuthbertson, formerly factory manager of the Los Angeles plant of the U. S. Rubber Co., has been appointed assistant production manager of the company's Tire Division with headquarters in New York. Dr. Cuthbertson started with U. S. Rubber in 1936 as a research chemist. Later, he rose to assistant director of the Tire Division's Development Department at Detroit before he was transferred to the Los Angeles plant. He has been succeeded at Los Angeles by B. S. Adams, formerly general foreman of the Tire Building and Curing Divisions at the plant. He has been associated with the company for the past 27 years.

"Kanigen" Nickel Plating Process

General American Transportation Corp., Chicago, Ill., has announced the availability of an entirely new process of nickel plating which greatly stretches the available nickel supply, and which "may well prove to be one of the most far-reaching industrial developments since World War II." General American will immediately build two new plants, one in East Chicago, Indiana, and the other in Los Angeles, Calif., to utilize the new process. These plants are expected to be in operation by the third quarter of 1953. Thereafter, other firms will be licensed to use the process since its applications are so wide and revolutionary that no one organization could meet all requirements. The new process, which requires no electrolytic equipment, has been named "Kanigen." It is said to promise remarkable economies in many industrial applications over customary methods, and in addition makes it possible to plate almost any solid substance including plastics and glass with a dependable and predictable thickness of a superior, non-porous plate.

Borden Develops Epoxide Adhesive

Development of a new epoxide resin adhesive suitable for bonding non-porous surfaces has been announced by the Chemical Division of the Borden Co. The product, "Epiphen XR-823," is said to have shown excellent results in bonding metal, glass, natural or synthetic rubber, ceramic materials and wood, phenolic and glass fiber laminates, either to themselves or in various combinations. The cured bond is resistant to boiling water, acids, alkalis and most organic solvents. This type of resin is also recommended for any casting and coating operations where shrinkage cannot be tolerated. The excellent wetting properties, fidelity, minimum shrinkage, high dielectric and mechanical strengths and high heat resistance of cast epoxides have resulted in their wide utilization for potting electronic assemblies, resistors and other uses in the electrical and electronic fields, the company states.

Boston Woven Hose Appointments

William H. Owen has been appointed product manager of the Flat Belting Department of the Boston Woven Hose & Rubber Co. Mr. Owen has been with the company for the past two and one-half years. Prior to his association with Boston Woven Hose, Mr. Owen was a sales engineer with C. O. Bartlett & Snow Co. of Cleveland, Ohio, for five years. Born in Buffalo, N. Y., Mr. Owen was graduated from Rensselaer Polytechnic institute with a B. S. degree in mechanical engineering. The company has also announced the appointment of John J. Bolger as sales office manager. The post was recently created to facilitate customer service. Mr. Bolger attended Northwestern University and has been with the concern for twelve years.

An index to Volume 72 of RUBBER AGE will be found on Pages 147 to 150 of this issue.

★ ★ ★ PLASTICIZER NEWS ★ ★ ★

INCREASED AVAILABILITY

Widens Use Of Plastolein Plasticizers as Primary, Basic Types

The completion of Emery's revolutionary ozone-oxidation plant in several months will increase the availability and improve the economic position of Plastolein Plasticizers to the point where they can be used more widely as primary plasticizers.

This particularly applies to Plastolein 9720 Polymeric. Greater availability at present economic levels, together with its proven performance, make this product particularly appealing as a primary plasticizer. Not only does it have all the requisites of a basic plasticizer, but its permanence in terms of resistance to water and oil, and low volatility, is superior to most primary-type plasticizers. In addition, 9720 is extremely stable to both heat and light, does not deteriorate or cause brittleness upon aging, and has the efficiency common to most monomeric types.

Proven Performance

Plastolein 9058 DOZ (di-2-ethylhexyl azelate) also has the performance requirements of a primary plasticizer. Now, because of new processing methods, such as the ozone-oxidation process, the economic picture is improving rapidly. This, coupled with greater availability and proven performance of Plastolein 9058 will lead to its wide selection as a primary, basic plasticizer in the not too distant future.

Emery invites all manufacturers who are not already using a Plastolein Plasticizer, to start an evaluation of these two products immediately. Samples and descriptive literature are available on request.

Completion of Plant Building Marks First Major Step Toward Increased Production

The new building which will house Emery's revolutionary ozone-oxidation process has now been completed. Already it contains some of the unique equipment for this operation which is scheduled to go on line in several months.

Emery's New Ozone-Oxidation Plant

Production of Azelaic and Pelargonic Acids, from this plant, will result in increased quantities of those Plastolein Plasticizers which are based on these exclusive, unique saturated acids. Specifically, this involves Plastolein 9050 DHZ (di-2-ethylbutyl azelate), Plastolein 9058 DOZ (di-2-ethylhexyl azelate), Plastolein 9055 DGP (diethylene glycol dipelargonate), Plastolein 9715 and 9720 Polymerics.

The acids themselves are used also in the manufacture of alkyd resins, synthetic lubricants, nylon-type polyamides, soaps, and in the flotation of various minerals. The greater availability of these acids should open up many new avenues of research based on their unique properties.

Plastolein 9057 DIOZ Announced!

Di-iso-octyl azelate Now Available in Commercial Quantities

The addition of Plastolein 9057 DIOZ (di-iso-octyl azelate) to its general line of Monomeric and Resinous Plasticizers has just been announced by Emery.

Similar in performance to di-2-ethylhexyl azelate (Plastolein 9058) Plastolein 9057 is a primary, monomeric plasticizer for all types of vinyls, cellulosics and synthetic rubbers.

In addition to the efficiency, compatibility and permanence that make it a basic, primary plasticizer, Plastolein 9057 imparts excellent low temperature flexibility. It is applicable to vinyl calender sheeting, calender and cast film, calender and dispersion coated fabrics, extruded products and plastisol formulations. Plastolein 9057 also offers efficiency and low temperature properties for nitrile and GR-S rubbers and cellulosics.

MAIL COUPON TODAY for descriptive materials on Emery Plastolein Plasticizers!

EMERY INDUSTRIES, INC., Dept. U-4
Carew Tower, Cincinnati 2, Ohio

Please send me: ☐ Plastolein Plasticizer Booklet
☐ Plastolein 9057 Technical Bulletin

Name.....*Title*.....

Company.....

Address.....

City.....*Zone*.....*State*.....

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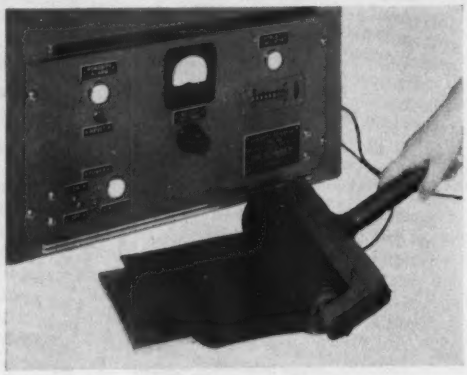
NEW EQUIPMENT

Viking Type PR Porosity Detector

A safe and effective means for detecting and recording minute holes in any material, including rubber, which is electrically non-conducting is said to be provided in the Viking Type PR Porosity Detector made by Viking Instruments, Inc., East Haddam, Conn. The company points out that since any dielectric material of a given thickness has a specific puncture voltage, porosity in



The Viking Porosity Detector tests any dielectric material up to 40,000ths of an inch in thickness.

that material may be detected by subjecting it to a voltage which is insufficient to puncture the material iself, but which is sufficient to arc across the air gap which exists if there is a hole, no matter how minute, extending through the material.

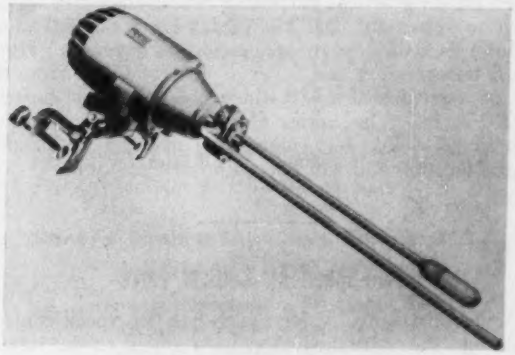
The standard type PR porosity detector has an adjustable voltage range of 500 to 5000 volts, a range which is sufficient for testing any dielectric material up to 40,000ths of an inch in thickness. A modification of this unit provides an adjustable voltage range of 1000 to 9500 volts, which is intended for testing dielectric materials up to ⅛th of an inch in thickness. The unit generates a high voltage of very low current density (a maximum of 50 microamperes) so that any detected holes will not be enlarged by burning or scorching of the material being tested.

In use the detector operates on the following principle: One side of the material to be tested is arranged to make contact with a roller or plate which is grounded. A roller which is electrically connected to the high potential source is then brought into contact with the other side of the material. Thereafter during the period the material is being tested, whenever a hole in the material passes between the grounded roller (or plate) and the roller which is electrically connected to the high potential source, a trigger tube is pulsed. The pulsed trigger tube drives a multivibrator which actuates a relay which controls the indicator lights, counters, and other electrical devices, such as visual signals, audible signals, web markers, etc., which are electrically connected to the instrument.

Rapisonic Homogenizer

A new machine based on the use of ultrasonic vibrations, which should prove of interest to all concerned with emulsions or suspensions, has been developed in England and is now available from the American Ultrasonics Co., 198 Pacific St., Newark, N. J. The machine, known as the Rapisonic Homogenizer, is based on the principle of the Pohlmann Whistle.

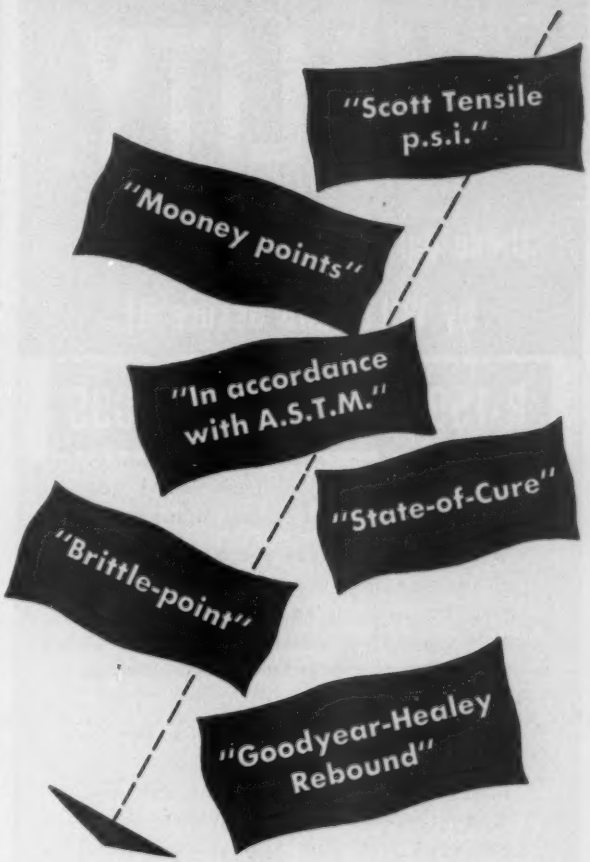
In the operation of the Rapisonic the vibrations are brought about by a jet of liquid impinging on a blade which vibrates at its natural frequency. Both jet form and blade are enclosed by a resonant bell which concentrates the local ultrasonic effect. Emulsification takes place when cavities are swept out by the blade which is oscillating at about 22 Kc, a frequency beyond the range of audition. On the collapse of these cavities, instantaneous local pressures of the order of 30,000 pounds per square inch are built up. This is the basis of the machine's efficiency, and although there is still some doubt as to what actually causes the dispersions, it is certain that the cavitation plays the main part and that other effects are secondary.



The Rapisonic has an output of 480 gallons per minute and is fully portable. It can be clamped on the side of all types of mixing vessels. All parts in contact with the liquids are of stainless steel and other parts are made of light weight alloys wherever possible to keep the power-weight ratio down to a minimum. The frequency at which the blade vibrates can be easily adjusted.

STATEX 125

TESTED IS TRUSTED



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Whatever your color problem, bring it to Williams. Our 75-year experience can often save you time, money, and headaches in proper color formulation.

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Miniature Pneumatic Transmitter

A miniature pneumatic transmitter for measuring and transmitting readings of temperature, pressure, vacuum, differential pressure, and liquid level to recording, indicating, and controlling receivers, including miniature type receivers, has been announced by the Bristol Company, Waterbury 20, Conn. Transmission is by means of air pressures of between 3 and 15 psi that have a direct relation to the measured quantity. This new type of transmitter, known as the Bristol Series 650 Pneumatic Transmitter, uses standard Bristol measuring elements and a simple transmitting mechanism with only one pivot and no flexures. Friction and lost motion are thereby eliminated for all practical purposes. The transmitter is sensitive to extremely small changes in the measured value, as little as 0.03% of range, including reversal. High-speed transmission and superior control result from the use of a pneumatic relay which has an output capacity of 3.0 scfm. The Series 650 Pneumatic Transmitter, weighing 7½ lbs., is weatherproof and can be installed in any location and will operate in any position.

Two-Speed Air Control Valve

A new air control valve which has two speed controls built into the valve body has been added to the line of air control valves produced by the Valvair Corporation, 454 Morgan Ave., Akron 11, Ohio. The principal use is to control the stroke of an air cylinder. According to the company, the advantages of built-in speed controls include the elimination of the necessity of purchasing or installing separate speed controls, simpler piping than usually required with separate speed control units, and considerable cost saving. The new valve is currently available in a standard four-way piped exhaust model in a ⅜-inch pipe size. Control assemblies to actuate the valve include knob, lever, clevis, treadle, foot, cam, cylinder, solenoid and diaphragm.

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An Industry-Wide Project for the Development of an Automatic Packaging Device for Pelleted Carbon Black and the Development of the Most Efficient Container for Such Black.

THIS IS AN INVITATION to any individual, company or corporation engaged in the manufacture of carbon black to participate as a stockholder in the new non-profit group, Carbon Black Packaging, Inc., recently organized for the purpose of developing an effective automatic packaging device for pelleted carbon black and the development of the most efficient and most economical container for such black.

CHARTERED in the State of Delaware, December 23, 1952.

FINANCING of the development program will be accomplished from a fund contributed by the stockholders and available for expenditure during the five year term of the agreement. In no event shall the stockholder's contribution be less than $1,000 per year or more than $20,000 per year.

SHARES in Carbon Black Packaging, Inc., are now offered for sale to individuals, companies or corporations. All contributions made to Carbon Black Packaging, Inc., including any income, will be used to meet expenses of the program. The stock in Carbon Black Packaging, Inc., is non-dividend bearing and will not in any case return to the owner more than the amount of cash contributed by them or it.

DEVICES or techniques developed as a result of the program may be used by the stockholder without further payment.

PERSONNEL required to carry on the research program will be obtained through the employment of a competent director of research with a carefully selected staff or existing research institutes utilizing manufacturing plants and existing laboratory facilities to minimize or eliminate investment of the research funds in capital items.

Address Inquiries to: **Carbon Black Packaging, Inc.**
Box 1389
Bartlesville, Oklahoma

Apply This Unique Cutting Principle to Meet YOUR Rubber Cutting Problems—

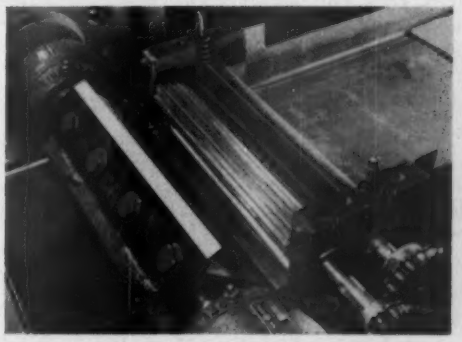
Note the shearing angle of the fly knife to the bed knife in this heavy duty class #500 machine.

TAYLOR-STILES RUBBER CUTTING MACHINES

include types specifically suited to the many uses for them in modern rubber manufacture. For example, cutting blanks into exact sizes for molding, for dicing prior to extruding or molding, for cutting into cubes for transporting or storing, for preparing stock for dissolving into cement, and for cutting scrap. One feature they have in common—a revolving knife cylinder with knives so set that they engage the bed knife with a shearing action that produces

—clean cut pieces of uniform size and shape, with a minimum of fines—

—large production with low labor and power costs.



Cutting and feed elements of a Class #100 machine

Class 100 Cutters are precision cutters for relatively light stock.
Class 200 Cutters are precision cutters for heavier work.
Class 300, 400, and 500 for cutting large quantities of the heaviest kinds of stock or scrap rubber where precision is not required.

Send for folder No. App. 202 and for complete information concerning the Taylor-Stiles Cutter to do your rubber or other industrial cutting job efficiently and economically.

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stabilizer Mark M makes a color difference in vinyl compounds

The two vinyl strips illustrated contained the same basic formulation. Processing temperature changed the strip on the left, while that on the right, containing Stabilizer Mark M, retained its true color.

Stabilizer Mark M is ideal for sensitive organic pigments such as lithol rubine reds, BON reds and alizarin violets. With lithol rubine red, for example, Stabilizer Mark M retains the blue-red hue.

Other typical applications of Stabilizer Mark M are the following:

With unsaturated plasticizers, such as alkyl and aryl oleates, alkyl and acetylated ricinoleates, furfuryl esters and partially hydrogenated terphenyls — Stabilizer Mark M greatly retards yellowing and oxidation.

With plastisols used in slush molding— Stabilizer Mark M does not form colored salts with copper.

And, because Stabilizer Mark M is a clear, easy-to-handle liquid, it mixes readily. Test it now in your formulation—write or phone today for a generous working sample.

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CHEMICAL LABORATORY

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Gottschoprinter Printing Machine

Almost all types of material processed in a continuous web can now be printed with trade-marks, code and part numbers, identifying names, or all-over decorative designs prior to rewinding, slitting, sheeting or fabricating. The unit designed to do this is a new machine called the Gottschoprinter, made by Adolph Gottscho, Inc., Hillside 5, N.J. The unit can be installed as part of a processing set-up to eliminate the need for printing materials in a separate installation, and installation is said to be extremely simple, requiring little or no change in an existing set-up. The Gottschoprinter prints on rubber, linoleum, plastics, gasket material, paper, metal, laminations, and similar materials varying in thickness from .001-inch to 1.0-inch and as wide as 72 inches. Printing is from rubber plates mounted on a steel cylinder and impressions are made as the web of material passes between the plate cylinder and the impression roll. The plates or dies are adhered to the printing cylinder by two-way adhesive made for this purpose, and can be readily replaced by new plates when copy changes are desired. Inks of almost any color can be used. Models available have maximum printing widths of 24, 36, 48, 60 and 72 inches.

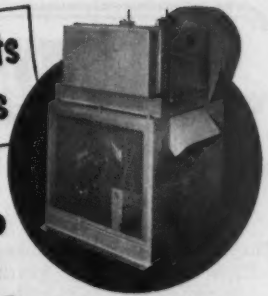
North American Philips Co., Inc., Mount Vernon, N.Y., has announced the availability of a new **x-ray image amplifier** that produces images 800 to 1200 times brighter than those obtained with the conventional fluoroscope. The unit makes it possible for radiologists to perform their work in a room and have nearly normal illumination. It is believed that the new amplifier will also be useful in conjunction with film cameras as a practical solution for the current problem of x-ray cinematography.

Designed to meet industry's need for adjustable speeds in the lower horsepower ranges, an improved **all-electric adjustable speed drive** of from ¾ to 3 h.p. has been developed by the Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland 10, Ohio. Processing units to which the new drive may be advantageously applied include rubber hose take-up stands, plastic wire coating extruder capstan and take-up stands, and plastic pipe extruder pull-out stands.

Dice Rubber Sheets into Small Cubes

WITH THE

CUMBERLAND ROTARY CHOPPING and DICING MACHINE



Widely used in the manufacture of RUBBER CEMENT, RUBBER COATINGS and MANY OTHER PRODUCTS.

As a chopper, this machine efficiently cuts rubber and rubber-compound slabs into small pieces — frequently used for *faster* dissolving. Two sizes available to handle stock widths up to 14" and 24". Also useful to salvage V-belts by reducing them to half-inch or shorter lengths.

In modified form as a dicer, this machine dices sheet stock into cubes of various sizes at input speed of 10 ft. to 125 ft. per min. Features the simplest, least expensive method of dicing yet devised!

WRITE FOR COMPLETE INFORMATION!

FOR GRANULATING PLASTIC . . . Investigate Cumberland's complete line of granulating machines. Request Bulletin 251.

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How to clean molds without brushing

LET the cleaning material do the work. There's an Oakite detergent and method for every mold—whether iron, steel, or aluminum—whether in the dip tank, by electrocleaning, or steam cleaning. You get results like these:

"No etching" (Pennsylvania)
"Expect 80% reduction in work cost, 50% increase in production (Maryland)
"Cleaning time cut from 24 hours to 2 (New Jersey)

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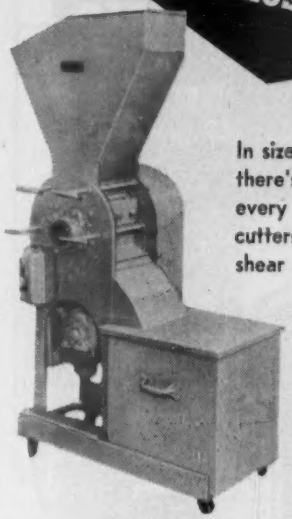
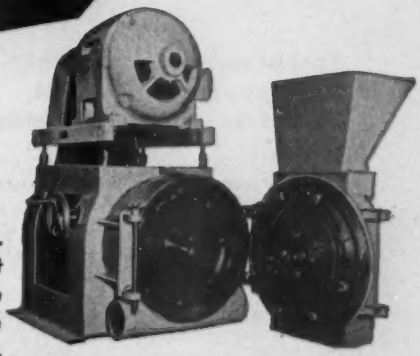
for cutting waste cleanly...speedily Foremost Cutters



In sizes from 1 to 50 Horsepower, there's a Foremost cutter to meet every requirement. All Foremost cutters feature a unique double-shear knife arrangement which permits concise cutting of rubber and rubber-like products. All are ruggedly built, simple to install, easy to operate and easy to clean. Foremost cutters will easily handle foam rubber, sponge rubber, rubber thread, rubber, cork, leather, plastics and paper.

for pulverizing to the finest mesh Foremost 50 H.P. Grinder



The 50 H.P. Foremost Grinder is the standard of the rubber industry. Installed in many of the nation's largest plants, it has proven itself time and again. It's rugged, easily accessible, easy to operate and requires little maintenance.

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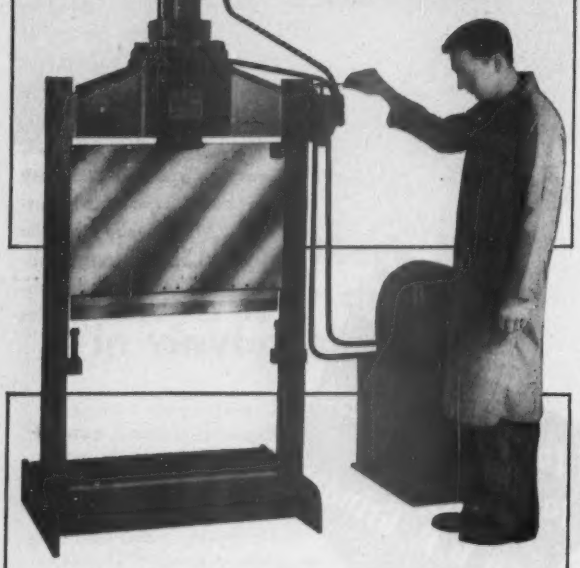

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REVIEWS

BOOKS

The Handbook of Measurement and Control. Edited by M. F. Behar. Published by the Instruments Publishing Co., Inc., 921 Ridge Ave., Pittsburgh 12, Penna. 8¼ x 11¼ in. 290 pp.

This handbook is designed to bring classifications, operating factors, and typical applications of instruments to users, manufacturers and students. The term "instruments," as here applied, includes all indicating, recording, integrating, controlling and computing devices used in measurement, inspection, testing, and control applications. Perhaps the most remarkable feature of the book is that although every class and type of measuring instrument is described adequately, explained fairly fully, and illustrated diagrammatically, commercial products are neither pictured nor even named in the text. However, each chapter is followed by advertising pages in which a number of instrument companies describe their respective commercial embodiments of the methods described in the immediately-preceding text. This is unusual treatment, and is due to a unique combination of editorial planning and publishers' make-up. The book has 16 chapters, each contributed by an outstanding authority. It is furnished without cost to subscribers to "Instruments," the annual subscription price of which is $4.00.

•

Studies of Accidents in the Rubber Industry. Issued by the National Joint Industrial Council for the Rubber Manufacturing Industry, Royal Exchange, Cross St., Manchester 2, England. 4 x 6½ in. 100 pp.

During the period from January, 1950, to June, 1952, more than 26,000 reports of accidents occurring in rubber plants in Great Britain were reported to the National Joint Industrial Council for the Rubber Manufacturing Industry. These accidents varied from those of a trivial nature to those with disastrous results. This report is a summary of the 26,000-odd accidents reported in the 30-month period mentioned. After first presenting a general analysis, the report delves into group analyses, divided into such subjects as persons falling, falling materials, machinery, hand tools, minor causes, collisions, heat, etc. It then devotes a section to positive guidance for accident prevention work in rubber factories of all kinds, and winds up with a chapter devoted to "the road ahead." Since accident prevention is a primary concern of every rubber plant, large or small, this report should be studied carefully by every rubber manufacturer.

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Electrical Engineering Problems in the Rubber and Plastics Industries. Published by the American Institute of Electrical Engineers, 33 West 39th St., New York 18, N. Y. 8½ x 11 in. 216 pp. $3.50.

The Third Annual Conference of the AIEE Subcommittee on Rubber and Plastics Industries was held in Akron, Ohio, on May 5, 1950, and the Fourth Annual Conference on April 28, 1952. These conferences consisted of one-day meetings, with 9 papers and 8 prepared discussions presented at the Third Conference and 8 papers and 2 prepared discussions presented at the Fourth Conference. All 17 papers and the 10 prepared discussions are included in this booklet which also includes extemporaneous discussion on almost every paper.

Titles of the 17 papers presented were: (1) Electric Drives for Calender Auxiliaries; (2) Lighting for Rubber and Plastics Plants; (3) Choice of Motor Speeds for Rubber Mill Room Service; (4) Recent Developments in Process Sequence Control; (5) The Role of Electronics in the Rubber and Plastics Industries; (6) Industrial Communication and Paging; (7) Recent Developments in Process Sequence Timing; (8) Electrostatic Casualties in the Rubber and Plastics Industries; (9) Control for a 4-Roll Z-Type Calender Train; (10) Design and Application of Electronic Control for the Rubber Industry; (11) Experience with Mercury Arc Rectifiers in the Tire Plant; (12) Ignitron Rectifiers Used for Industrial Power Supply; (13) 300 KW Hewittic Rectifier; (14) Application of the Beta Gauge to Calendering Processes; (15) Adjustable Voltage DC Drives for Rubber and Plastics Plants; (16) Adjustable Voltage Drive Utilizing Magnetic Amplifier Control; (17) The New Safety Code for Mills and Calenders in the Rubber Industry.

•

Radioisotopes in Industry. Edited by John R. Bradford. Published by Reinhold Publishing Corp., 330 West 42nd St., New York 36, N. Y. 6 x 9 in. 309 pp. $8.00.

Based on a series of lectures presented at the Case Institute of Technology in April, 1951, this book covers all of the important industrial applications of radioactive isotopes. The original material, contributed by 16 lecturers, was amended to include the most recent developments and accordingly the book represents a succinct compilation of the most up-to-date available information on this scientific field. Written with a minimum of mathematical treatment, the book covers not only the many uses of radioisotopes but such important related subjects as laboratory construction, shielding, personnel protection, handling techniques, and radioactive waste disposal. Of special interest to physicists is a chapter on the recently developed industrial uses of gross fission products prepared by a group of collaborators at Stanford Research Institute. There are 14 chapters in all, two appendices, and a subject index.

STATEX
125

Pneumatic Tyre Design. By E. C. Woods. Published by the Institution of the Rubber Industry, 12 Whitehall, London S.W. 1, England. 6 x 8½ in. 96 pp. 21s (approximately $3.00).

Some time ago the Council of the Institution of the Rubber Industry agreed to sponsor the publication of occasional monographs on suitable subjects of importance in connection with rubber science and technology, thus enabling the society to give fuller treatment to some subjects than is often possible in "Transactions." It is appropriate that this first monograph be devoted to a subject of fundamental interest in connection with one of rubber's major applications, i.e., the tire.

As indicated by its title, this first monograph is devoted to pneumatic tire design, and it traces the development of such design since a patent specification describing the application of a hollow inflatable tube to the periphery of a road wheel was filed in 1845 by R. W. Thomson. After first treating with the early history of tire design, the monograph covers tread design, mold design, cord angles, layout, ply widths, and building specifications in that order. There are two appendices, one devoted to the calculation of design charts and the other to an extensive bibliography. An index is included.

Two additional monographs are in preparation and should be available in the near future. These are "Calendering," by H. Willshaw, and "Ageing and Weathering," by J. M. Buist.

■

Planning and Developing the Company Organization Structure. By Ernest Dale. Published by the American Management Association, 330 West 42nd St., New York 36, N. Y. 6 x 9 in. 232 pp. $4.50.

Designed to aid the practical man of affairs as well as the student of organization, this book is an analysis of the development and change of the organization structure of the individual company. The study is confined largely to the organization of manufacturing companies, with only brief reference to retail and service activities. To secure his data, the author visited 40 top companies considered to have harmonious organization structures and spot-checked about 150 others on specific questions. The main body of the report is divided into two parts, the first dealing with the dynamics of organization and the second with the mechanics. It offers detailed guidance for analyzing existing structures with methods suggested for modifying or changing such structures, in the light of the best established practices, to conform to the needs of the individual company.

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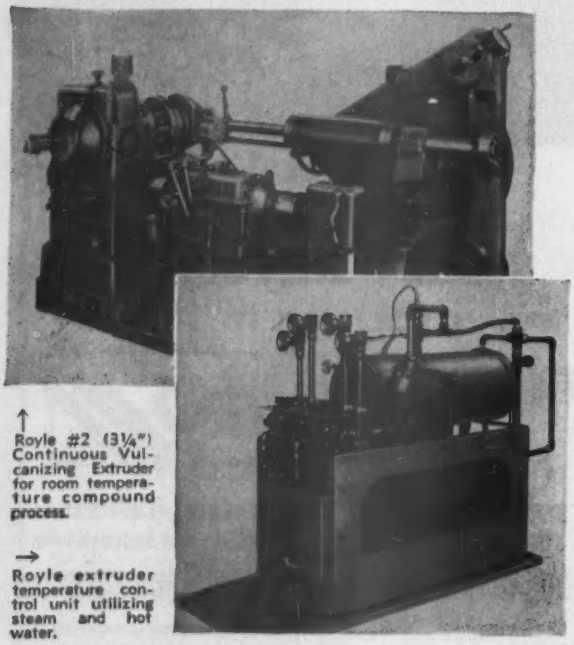

↑ Royle #2 (3¼") Continuous Vulcanizing Extruder for room temperature compound process.

→ Royle extruder temperature control unit utilizing steam and hot water.

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BOOKLETS, CATALOGS, etc.

The Neoprenes: Principles of Compounding and Processing. By Neil L. Catton. Issued by Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Delaware. 6 x 9 in. 246 pp.

Rarely has any supplier of rubber chemicals or compounding ingredients or of basic raw materials gone to the expense and trouble of issuing a compendium on a single material as DuPont has done in the current instance. The vast information which has appeared on the various neoprenes since their initial introduction two decades ago has been assembled into this book which serves a two-fold purpose—one as a reference book for the technologist and the other as a textbook for the young men in the rubber industry.

The book presents a discussion of the fundamental principles of compounding and processing of all types of dry neoprene. It is divided into four major sections, as follows: (1) Types of Neoprene; (2) General-Purpose Neoprenes; (3) Special-Purpose Neoprenes; (4) Vulcanizate Properties. It also has a number of appendices devoted to specifics, such as the storage stability of neoprene, viscosity solutions in various solvents, Banbury mixing, typical calendering set-ups, control of backrinding, thermal and electrical properties, and chemical resistance. There is also an extensive bibliography and a carefully cross-referenced index. Numerous illustrations, graphs, charts, and tables are sprinkled throughout the text.

•

Electronik Controllers. (Catalog 1530). Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Penna. 8½ x 11 in. 56 pp.

All types of "Electronik" controllers which are used to measure and control a multiplicity of variables are described in this catalog. Included are detailed specification and control action descriptions and ratings for both electric and pneumatic type controllers. The catalog also presents engineering data on the "Electr-O-Line" and "Electr-O-Pulse" electric control relays.

•

Protection Against Rain and Mildew with Milmer 1. Organic Chemicals Division, Monsanto Chemical Co., St. Louis 4, Mo. 8½ x 11 in. 12 pp.

Specific application information, backed up with test results showing possibilities of savings by properly combating the ravages of mildew in several industrial fields with "Milmer 1," is presented in this booklet. Effective techniques for incorporating the product in vinyl film and tubing, leather, paper products, etc., are also offered.

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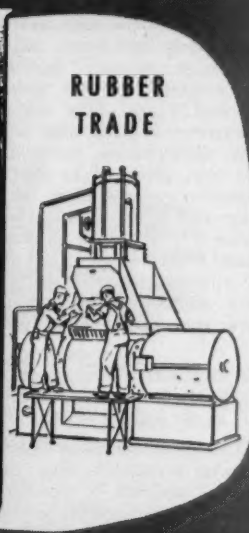

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New York 7, New York

Hycar Technical Manual. Issued by the B. F. Goodrich Chemical Co., 2060 East 9th St., Cleveland 15, Ohio. 8½ x 11 in. 250 pp.

To assist manufacturers in the use of Hycar rubber, the Hycar Blue Book was issued in 1943. Supplements to this book were issued from time to time covering new information on polymers, compounding ingredients, and specific formulations. Much of this data has proved of sufficient value to be issued in the form of a permanent reference book, and the result is this new Hycar Technical Manual. The new manual includes data which enable the experienced compounder to develop formulas to meet his particular specifications. Included, however, are test formulas which have been developed to meet a wide variety of specifications commonly encountered in the industry. A limited amount of background information is furnished for the assistance of compounders who may be unfamiliar with Hycar materials. The manual is divided into seven sections covering, respectively, general information, compounding, application compounding, specification compounding, Hycar blends, effect of immersion data on Hycar vulcanizates, and laboratory procedure and test methods.

•

Calrod Electric Heaters and Heating Devices: 1953. (GEC-1005D). General Electric Co., Schenectady 5, N. Y. 8½ x 11 in. 60 pp.

Descriptions of this equipment in terms of application, special features, installation data and pricing are contained in this catalog. Indexed by process and application, it also contains methods of determining power requirements and heat losses by applications. These are explained by both graphs and formulas. Another feature of the publication is an index of G-E application bulletins, and data and specification sheets available from the company. A total of 175 photographs and drawings illustrate the various heater-types of products, including immersion, strip, cartridge, tubular, insertion and fin heaters. Other devices described in the catalog are melting pots, thermostats, switches, oven heaters, and induction heaters.

•

High-Surface Sodium. U. S. Industrial Chemicals Co., 120 Broadway, New York 5, N. Y. 8½ x 11 in. 20 pp.

In essence, this booklet is a working manual and guide to procedure for those interested in developing specific formulations for specific usage of the chemical. The material is described as to its chemical and physical properties, while typical applications are also considered. Handling procedures are outlined. A handy bibliography is appended.

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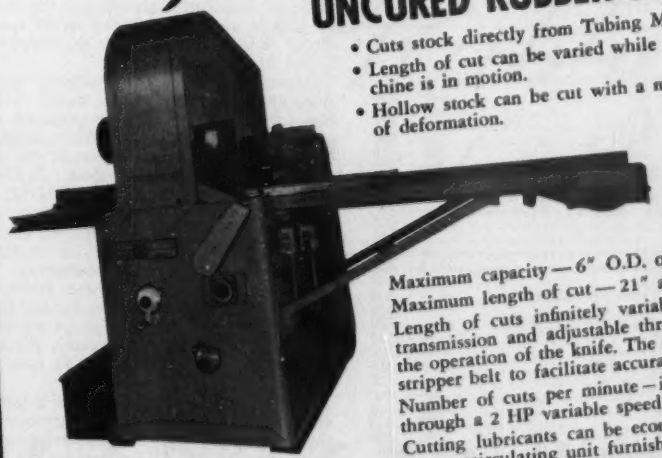

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Maximum length of cut—21" at lower speeds.
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Cutting lubricants can be economically applied through a separate recirculating unit furnished in addition if desired.

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MARKETS

NEWS-PRICES

NEW YORK, APR. 7, 1953

Raw Rubber

Natural: Since our last report (March 5), the price of spot rubber on the New York Commodity Exchange has moved in a range of 3.50c, high for the period being 27.38c reached on March 6, and low being 23.88c reached on April 7. The average price of spot rubber for the month of March was 26.59c, based on 22 trading days. This compares with an average of 27.57c in the previous month.

Downward tendencies in the price of natural rubber remain unchecked with the weakness reflecting, to some degree, the peace feelers about Korea. Spot prices in New York were down to the lowest level in three years, and this may have an unsettling influence in Singapore.

For the past several months the market in Singapore has been supported primarily by leading dealer interests. Declining tendencies in the market in recent weeks have brought with it about ten failures in Singapore and it is entirely possible that reports of additional failures may be heard should further anticipated weaknesses in the Singapore market develop.

Ocean shipments from Malaya in March were estimated by the registrar of statistics at 73,313 long tons, against 66,776 long tons in February and 85,794 in March of 1951. Shipments for the first three months of this year totaled 210,810 long tons against 243,911 last year.

Synthetic: The price of GR-S delivered at a consuming plant in the United States is roughly about 24.40c per pound. Based on the sale of May No. 1 Ribbed Smoked Sheet at 23.88c, it costs a consumer in Akron about the same price for No. 1 Ribbed Smoked Sheet as synthetic rubber. On the average, Ribbed Smoked Sheets are currently about 10% under the price of synthetic rubber. The question is how much lower the price of natural rubber will have to go before increased substitution takes place.

According to the Reconstruction Finance Corporation, sales of GR-S in January and February of this year were restricted to 94% of the 1952 fourth quarter usage or monthly average purchases of 1952, whichever was higher. There were no limitations on sales in March. It is expected that sales in March will exceed 66,000 long tons (gross, less carbon black), while sales in April have been estimated at 63,000 long tons.

Both RFC and Congress seem convinced that there will be no buyers for the alcohol-butadiene plants, since they are such high-cost operations. It costs about 33c to make a pound of synthetic rubber from alcohol-butadiene as against 18c for rubber made from petroleum butadiene. RFC, however, has asked that no barrier be put in the way of selling the alcohol facilities, since buyers may appear who want to produce butadiene for other consuming industries. In addition, there may be temporary shortages of GR-S during the period of transferring plants to private ownership, particularly if all the plants are not sold.

Price Data

Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)

FROM MARCH 6 TO APRIL 7

Mar.	Spot	May	July	Sept.	Dec.	Sales
6	27.38	26.65	26.05	25.70	25.51	21
7	——	——	——	——	——	——
8	——	——	——	——	——	——
9	27.00	26.35	25.70	25.40	25.20	83
10	26.62	26.26	25.65	25.30	25.15	126
11	26.38	26.20	25.60	25.25	24.95	84
12	26.38	26.10	25.60	25.25	24.90	30
13	26.50	26.20	25.65	25.25	25.00	50
14	——	——	——	——	——	——
15	——	——	——	——	——	——
16	25.88	25.70	25.35	25.00	24.75	42
17	26.00	25.80	25.40	25.10	24.75	43
18	26.25	26.10	25.55	25.25	24.90	9
19	26.25	26.19	25.75	25.30	25.00	90
20	26.50	26.23	25.75	25.35	25.15	44
21	——	——	——	——	——	——
22	——	——	——	——	——	——
23	26.38	26.10	25.65	25.35	25.05	29
24	26.50	26.30	25.90	25.50	25.25	10
25	26.50	26.25	25.89	25.50	25.25	16
26	26.25	26.00	25.50	25.21	25.00	16
27	26.12	25.85	25.50	25.20	24.90	63
28	——	——	——	——	——	——
29	——	——	——	——	——	——
30	25.62	25.16	25.05	24.90	24.55	121
31	25.12	24.75	24.60	24.45	24.20	101
April						
1	25.25	24.60	24.50	24.30	24.05	35
2	25.00	24.60	24.50	24.30	24.10	21
3	——	——	——	——	——	——
4	——	——	——	——	——	——
5	——	——	——	——	——	——
6	24.38	23.85	23.87	23.70	23.60	48
7	23.88	23.25	23.30	23.20	23.05	41

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.23⅞
April	.23¾
May	.23½
Thin Latex Crepe:	
Spot	.27½
Thin Brown Crepe, No. 2	.22⅛
Smoked Blankets	.21⅛
Flat Bark Crepe	.19⅜

London Market

(Standard Smoked Sheets)

May	23.04 - 23.19
July-Sept.	23.04 - 23.19

Singapore Market

(Standard Smoked Sheets)

May	21.29

Synthetic Rubber

(Dry Types—Per Pound)

Butaprene NF	.490 - .500
Butaprene NL	.500 - .510
Butaprene NAA	.540 - .550
Butaprene NXM	.580 - .590
Chemigum 30N4NS	.500 - .510
Chemigum 50N4NS	.500 - .510
Chemigum N3	.580 - .590
G-E Silicone Rubber (compounded)	3.15 -4.00
G-E Silicone Gum (not compounded)	—— -4.48
GR-I	—— - .2075
GR-S	—— - .230
Hycar OR-15	.580 - .590
Hycar OR-25	.500 - .510
Hycar OS-10	.550 - .560
Neoprene Types CG and AC	—— - .500
Neoprene Type E	—— - .650
Neoprene Types FR and KNR	—— - .800
Neoprene Type GN	—— - .380
Neoprene Type GN-A	—— - .380
Neoprene Type RT	—— - .400
Neoprene Type S	—— - .380
Neoprene Type W	—— - .400
Paracril B	.500 - .510
Paracril BJ	.500 - .510
Paracril C	.580 - .590
Silastic (compounded)	2.35 -4.40
Thiokol Type A	—— - .470
Thiokol Type FA	—— - .640
Thiokol PR-1	—— - .950
Thiokol Type ST	—— -1.000

Middling Upland Quotations

	Mar. 5	April 7		
	Close	High	Low	Close
May	33.57	33.30	33.17	33.27
July	33.77	33.38	33.26	33.34
Oct.	33.83	33.44	33.34	33.38

Liquid Latex

Natural: According to Latex and Rubber, Inc., demand for Hevea latex continues to exceed the supply. Present United States consumption now closely approximates the quantity imported, just over 6,000 tons a month. Stocks are steady at the same figure, representing a 30-day supply.

United States prices for A.S.T.M. quality centrifuged concentrated Hevea latex, for "spot" and "nearby" delivery, in rail tank car, f.o.b. port of arrival, has been hovering around 40c per pound. Sales have been made at this figure for the past few weeks. In some instances, higher prices have been indicated, particularly for small lots.

Some quarters expect the July-December, 1953, period to be in better balance than was the first half of the year because of increased production and a "levelling off" of U. S. consumption and/or reduced consumption in some lines.

Synthetic: U. S. prices for GR-S latices range from 21.5 to 26c per pound solids, in tank cars f.o.b. works. A uniform freight rate of 1c per pound wet weight charged by the Reconstruction Finance Corporation pays the freight to the buyer's destination in the United States.

Consumption of neoprene latices in the United States is currently running at about 700 tons a month with production slightly larger than the demand. Stocks appear to be in excess of a 45-day supply.

Acrylonitrile latices are presently being consumed in the United States at a rate of approximately 350 tons a month. Production is slightly in excess of this figure and there are stocks for 60 to 90 days.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of 90 points since our last report (March 5), high for the period being 34.55c reached on March 12, and low being 33.60c reached on March 23. The average price of middling uplands for the month of March was 34.10c, based on 22 trading days. This compares with an average of 33.76c in February.

According to the International Cotton Advisory Committee, free world production of cotton in 1952-53 is presently estimated at 28,300,000 bales, against 28,600,000 bales last season. Production in the western hemisphere totaled about 25,000,000 bales, virtually the same as in 1951-52.

The American Cotton Manufacturers Institute wants the government to abandon its practice of issuing early estimates of cotton crop acreage and production. The Institute maintains that these early estimates are not predicated on factual information and tend only to disrupt the trade. The only crop reports necessary, the Institute says, should be confined to crop conditions.

The world capacity to produce cotton for export is about 3,000,000 bales greater than the capacity of importing countries to consume it and from all indications the U. S. will have to take the brunt of bringing production into line with demand, the International Federation of Agricultural Producers said recently. The Federation estimated the total annual needs of all countries importing cotton should be about 12,000,000 to 13,000,000 bales. Exporting countries have the capacity to produce 16,000,000 bales for export, with the U. S. able to export about 8,000,000 bales.

MARKETS

NEWS-PRICES

NEW YORK, APR. 7, 1953

Reclaimed Rubber

According to the trade, there was a considerable increase in the demand for reclaimed rubber during March. Prices have remained steady, with most grades selling at or below former OPS ceilings. Eastern reclaimers are reported to be paying from $12 to $13 a ton for tires, with Akron prices running slightly higher.

Preliminary estimates by the Rubber Division of the National Production Authority state that in the first two months of 1953, 48,625 long tons of reclaimed rubber were consumed in the United States. This compares with the 51,071 long tons which were consumed in the first two months of the preceding year. Stocks on hand as of February 28, 1953, amounted to 43,306 long tons.

Reclaim production so far in 1953 seems to be keeping pace with that of the year before. Imports, however, are considerably higher, although the over-all total is rather small. Exports in the first two months of 1953 are just about what they were in the first two months of 1952, approximately 1,800 tons. Current prices follow:

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.10½
First Line Whole Tire	.10
Second Line Whole Tire	.09½
Third Line Whole Tire	.09¼
Fourth Line Whole Tire	.08¾
Black Carcass	.14¼
No. 1 Light Colored Carcass	.20¾
No. 1 Select Peel	.11¾
No. 1 Peel	.10½
Butyl Tube Reclaim	.12½
S.P. Natural Rubber Black Tube	.16
Natural Rubber Black Tube	.15
Natural Rubber Red Tube	.24¼
Natural Rubber Gray Tube	.24¼

Tire Fabrics

Rayon tire fabric yarn demand remains at a very high level and should continue with the increasing number of vehicles in operation. Tire cord producers report that their industry is running at capacity as tire makers are well on their way toward producing a record number of tires this year. Industrial Rayon Corp., for example, reports that two-thirds of its total output is currently going into the construction of rayon tire cord.

It has been reported that shipments of rayon yarn to tire, hose and belting manufacturers in the fourth quarter of 1952 amounted to approximately 102,000,000 pounds. The total for 1952 represented a new record, 403,000,000 pounds. The 1952 rayon consumption by manufacturers of tires, hose, belting, etc., was about 24% higher than the 1951 total. Prices for industrial fabrics have remained steady throughout the period. Prices follow:

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.76½
1650	lb.	.73½
2200	lb.	.73

Nylon Tire Cord

210	lb.	2.00
840	lb.	1.98

Rayon Graded Fabric

1100	lb.	.72
1650	lb.	.69½
2200	lb.	.68½

Cotton Chafers

14.4 oz. (per square yard)	lb.	.74
9.25 oz. (per square yard)	lb.	.69½
11.65 oz. (per square yard)	lb.	.66
8.9 oz. (per square yard)	lb.	.71

Scrap Rubber

The scrap rubber market continues to be characterized by rather quiet trading conditions. The trade reports that there was little business being done at Eastern trading points, although the situation was reported to be somewhat better in the Midwest. Trading at Akron was slightly better than in the East but still far from brisk. Business at Akron included small sales of both tires and tubes.

The market outlook, while not exactly gloomy, is still far from promising. Most trade sources indicated that they did not expect any improvement in trading conditions in the near future. Prices have been adjusted somewhat to reflect the current picture. Current prices follow:

(Prices Delivered Akron)

Mixed tires	ton	16.00
Light colored carcass	lb.	.05
No. 1 peelings	ton	48.00
No. 2 peelings	ton	30.00
No. 3 peelings	ton	24.00
Buffings	ton	18.00
Truck and Bus S.A.G.	ton	18.00
Passenger S.A.G.	ton	17.00
Natural Rubber Red Tubes	lb.	.13
Natural Rubber Black Tubes	lb.	.04¼
Butyl Rubber Tubes	lb.	.04

Rubber

Natural - Synthetic

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In Akron:
Tanney-Costello, Inc.
868 E. Tallmadge Ave.
Blackstone 4148

In California:
Merit Western Co.
George Steinbach
717 So. Date Avenue
Alhambra, California
Cumberland 3-1400

CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

APRIL 3, 1953

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

***For Export Only**

The arrangement of this section closely follows the Chemical Section of the 1951-52 RUBBER RED BOOK. Readers are referred to the RUBBER RED BOOK for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)	lb.	.48 -	.55
A-32	lb.	.61 -	.68
A-77	lb.	.47 -	.60
A-100	lb.	.47 -	.60
Accelerator No. 8	lb.	— -	1.01½
Accelerator—49	lb.	.49½ -	.50½
Accelerator—552	lb.	— -	2.07
Accelerator—808	lb.	.61 -	.63
Accelerator—833	lb.	1.17 -	1.19
Altax	lb.	.43½ -	.45½
Ancap *	lb.	.35 -	.37
Ancatax *	lb.	.43½ -	.45½
Ancazate * BU (ET & ME)	lb.	— -	1.03½
Ancazide * ET	lb.	— -	1.03½
ME	lb.	— -	1.13½
Arazate	lb.	— -	2.23½
Beutene	lb.	.61 -	.63
Bismate, Rodform	lb.	— -	3.00
Butasan	lb.	— -	1.03½
Butazate	lb.	— -	1.03½
Butyl Accelerator 21	lb.	.87½ -	.88
Butyl Eight	lb.	1.00 -	1.35
Captax	lb.	.35 -	.37
C-P-B	lb.	— -	1.95
Cumate, Rodform	lb.	— -	1.45
Dibenzo G-M-F	lb.	— -	2.58½
Diorthotolylguanidine	lb.	.54 -	.55
Diphenylguanidine	lb.	.44½ -	.45½
El-Sixty	lb.	.46½ -	.53½
Ethasan	lb.	— -	1.03½
Ethazate	lb.	— -	1.03½
Ethyl Thiurad	lb.	— -	1.03½
Ethyl Tuex	lb.	— -	1.03½
Ethylac	lb.	.91 -	.93
G-M-F	lb.	— -	2.58½
Good-rite Erie	lb.	.35 -	.37
Guantal	lb.	.55 -	.62
Harvex	lb.	.62 -	.68
Hepteen	lb.	.43½ -	.45½
Base	lb.	1.80 -	1.85
Ledate, Rodform	lb.	— -	1.00
MBT-XXX	lb.	.45½ -	.47½
Merae	gal.	.75 -	.80
Mercaptobenzothiazole	lb.	.35 -	.42
Mercaptobenzothiazyl Disulfide	lb.	.43½ -	.50½
Mertax	lb.	.45½ -	.52½
Methasan	lb.	— -	1.03½
Methazate	lb.	— -	1.03½
Monex	lb.	— -	1.13½
Mono Thiurad	lb.	— -	1.13½
Morfex	lb.	.61 -	.63
2-MT	lb.	— -	.77½
NA-22 (for neoprene)	lb.	— -	1.50
NOBS No. 1	lb.	.68 -	.70
O-X-A-F	lb.	.44½ -	.46½
Pentex	lb.	— -	1.03½
Flour	lb.	— -	.20½
Permalux (for neoprene)	lb.	— -	2.17
Phenex	lb.	.49 -	.54
Pip-Pip	lb.	— -	2.07
R-2 Crystals	lb.	— -	2.20
Rotax	lb.	.45½ -	.47½
RZ-50	lb.	— -	1.00
SA 52	lb.	— -	1.13½
SA 57	lb.	— -	1.03½
SA 62	lb.	— -	1.03½
SA 66	lb.	— -	2.50
SA 67	lb.	— -	1.03½
SA 77	lb.	— -	1.03½
Santocure	lb.	.68 -	.75
Selenac (Ethyl, Methyl)	lb.	— -	1.50
Setsit-5	lb.	.75 -	1.05
SPDX-GH	lb.	.64 -	.69
GL	lb.	— -	.95
Tellurac	lb.	— -	1.45
Tepidone	lb.	.45 -	.48
Tetrone A	lb.	— -	1.91
Thiofide	lb.	.43½ -	.50½
S	lb.	.46½ -	.53½
Thionex	lb.	— -	1.13½
Thiotax	lb.	.35 -	.42
Thiurad	lb.	— -	1.13½
Thiuram E	lb.	— -	1.03½
M	lb.	— -	1.13½
Trimene	lb.	.56 -	.58
Base	lb.	1.03 -	1.06
Tuads, Ethyl	lb.	— -	1.03½
Tuads, Methyl	lb.	— -	1.13½
Tuex	lb.	— -	1.13½
Ultex	lb.	1.00 -	1.05
Unads	lb.	— -	1.13½
Ureka Base	lb.	.66 -	.73
Vitasan Crystals	lb.	.48 -	.53
Vulcacure NB	lb.	— -	.45
ZB	lb.	— -	.85
ZE	lb.	— -	.85
ZM	lb.	— -	.85
Z-B-X	lb.	— -	2.45
Zenite	lb.	.43½ -	.45½
A	lb.	.51½ -	.53½
Zenite Special	lb.	.44½ -	.46½
Zetax (uncoated)	lb.	.44½ -	.46½
Zimate, Butyl	lb.	— -	1.03½
Zimate, Ethyl	lb.	— -	1.03½
Zimate, Methyl	lb.	— -	1.03½

ACTIVATORS

Blue Lead Sublimed (dlvd.)	lb.	.14¾ -	.15¾
Fish Oil, Hydrogenated, Fatty Acid			
Hydrofol Acid (dlvd.)	lb.	.10 -	.14¾
Hyfac 430 (dlvd.)	lb.	.14 -	.15¼
Neo-Fat H.F.O. (dlvd.)	lb.	.14½ -	.15¾
Stearex Beads (dlvd.)	lb.	.09 -	.10¼
Lime, Hydrated			
Arrowhead	ton	— -	20.65
Marblehead	ton	— -	15.50
Sierra	ton	— -	19.50
Litharge			
Eagle-Picher (dlvd.)	lb.	.14¾ -	.15¾
SB (dlvd.)	lb.	— -	.15¾
Magnesium Oxide, Heavy			
General Magnesite 500	lb.	.05 -	.06½
600	lb.	.06 -	.08
Michigan No. 15	lb.	.05½ -	.06
Permanente	lb.	.05 -	.06½
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	— -	.31
General Magnesite (Neoprene Grade)	lb.	— -	.30
General Magnesite No. 101	lb.	— -	.19½
Genmag ML	lb.	— -	.25
K & M (Neoprene Grade)	lb.	.30 -	.31
Maglite D	lb.	— -	.25
M	lb.	— -	.31
Marine's (Neoprene Grade) (l.c.l.)	lb.	— -	.30
Michigan No. 30	lb.	— -	.24
No. 40 Extra Light	lb.	— -	.31
Witco Extra Light	lb.	.32 -	.35
Oleic Acid			
Emersol 210 (dlvd.)	lb.	.10¼ -	.13¾
L.C.P. Red Oil	lb.	.10¾ -	.13¾

ACTIVATORS (Cont'd)

Palm Oil Fatty Acid (c.l.)	lb.	.12¼ -	.13½
Potassium Oleate (dms.)	lb.	.45 -	.55
Red Lead			
Eagle-Picher	lb.	.15¾ -	.16¼
No. 2 RM (dlvd.)	lb.	— -	.16¾
Sodium Laurate, 75%	lb.	.64 -	.74
Sodium Oleate, 75%	lb.	.45 -	.55
Paste (dms.)	lb.	— -	.20
Sodium Stearate, 75%	lb.	.45 -	.55
USP Grade (drums)	lb.	— -	.37
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.11 -	.12¼
Groco 53	lb.	.11 -	.12¼
Stearex B (dlvd.)	lb.	.13½ -	.16¾
Stearic Acid, Double Pressed			
Groco 54	lb.	.11½ -	.12¾
Stearic Acid, Other			
Neo-Fat 1-58	lb.	.1190 -	.1315
1-60	lb.	.1400 -	.1525
1-65	lb.	.1450 -	.1575
White Lead Basic Carbonate	lb.	.15¾ -	.16¾
White Lead Basic Sulfate	lb.	.14¾ -	.15¾
Zinc Laurate			
Laurex	lb.	.30 -	.31
Zinc Stearate	lb.	.37 -	.39
Aquazinc	lb.	.20 -	.35

Unclassified Activators

Actifat (dms.)	lb.	— -	.18
Aktone	lb.	.22 -	.23
Barak	lb.	— -	.62
Curade	lb.	.57 -	.59
D-B-A	lb.	— -	1.95
Dibutylamine (dlvd.)	lb.	.53 -	.55¾
MODX	lb.	.295 -	.345
Polyac	lb.	— -	1.65½
Ridacto (drums)	lb.	.25 -	.26
Snodette (dlvd.)	lb.	.15½ -	.16¾
Vulklor	lb.	.75 -	.85

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.17 -	.21
Aqua Ammonia (dms.)	lb.	.031 -	.035
M.B.M. (l.c.l.)	lb.	— -	.35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	— -	.20
Regular	lb.	— -	.12
D.C. Antifoam A	lb.	5.65 -	6.65
Antifoam A Emulsion	lb.	2.30 -	4.00
Antifoam AF Emulsion	lb.	2.51 -	2.95
Defoamer A-25	lb.	— -	3.00
Deltyl Prime	lb.	.70 -	.82
Defoamer 630	lb.	— -	.12½
Emcol IM	lb.	— -	.65
Kessco X-3 (dms.)	lb.	— -	.47¾
Modicol A	lb.	.12 -	.15
B	lb.	.35 -	.40
RS-968	lb.	.38 -	.38½
Terpinol Prime No. 1	lb.	.39 -	.54

ANTIOXIDANTS

Agebest 1293-22A	lb.	1.90 -	2.00
Agerite Alba	lb.	2.27½ -	2.37½
Gel	lb.	.62 -	.64
Hipar	lb.	.94 -	.96
H. P.	lb.	.69½ -	.71½
Powder	lb.	.50½ -	.52½
Resin	lb.	.67 -	.69
Resin D	lb.	.50½ -	.52½
Stalite	lb.	.50½ -	.52½
White	lb.	1.45 -	1.55
Akroflex CD	lb.	.69½ -	.71½
Aminox	lb.	.50½ -	.52½
Antioxidant 2246	lb.	1.65 -	1.68
Antox	lb.	.50½ -	.52½
Aranox	lb.	— -	3.25
Benzoquinone	lb.	1.50 -	1.75
Betanox Special	lb.	.72½ -	.74½
B-L-E	lb.	.50½ -	.52½
Carvacrol	lb.	— -	.78
Deenax	lb.	.95 -	1.05
Di-tert-Butyl-para-Cresol	lb.	.91 -	.95
Eugenol C-95%	lb.	3.34 -	3.54
Flectol H	lb.	.50½ -	.57½
Flexamine	lb.	.69½ -	.71½
Neozone A	lb.	.52½ -	.54¼
C	lb.	— -	.69½
D	lb.	.50½ -	.52½

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RESORCINOL is used for preparation of adhesives that assure a strong bond between rubber and fabric or cords. Koppers Resorcinol used in pre-dip treatment produces excellent bonding of rubber to cotton, rayon and nylon fabrics.

DI-tert-BUTYL-para-CRESOL has wide application as an antioxidant in white rubber products. It retards cracking, checking, hardening or loss of strength without discoloring the product or staining materials with which the product comes in contact.

DIVINYLBENZENE (20% and 40% grades) in synthetic rubber manufacture improves processing and decreases shrinkage of the product. With styrene and other monomers, it produces insoluble and infusible copolymers.

STYRENE MONOMER can be polymerized with other active olefinic materials to produce a variety of synthetic rubbers having various properties.

DI-tert-BUTYL-meta-CRESOL is suggested for use in the preparation of hard rubber or ebonite from GR-A synthetic rubbers. It is reported to improve tensile strength of ebonite and increase tackiness of the stock. Sulfides of DBMC have been reported to be effective peptizing agents for reclaiming of GR-S type synthetic rubbers.

MONO-tert-BUTYL-meta-CRESOL has been reported to be an effective anti-flex cracking agent in rubber and rubber-like materials. The resin obtained by condensation of MBMC with formaldehyde has been shown to impart tack to GR-S rubber.

TECHNICAL BULLETINS AVAILABLE

For further information on any of the above chemicals, write for the Technical Bulletin on the chemical (s) in which you are interested. Please address: Koppers Company, Inc., Chemical Division, Dept. RA-43, Pittsburgh 19, Pa.

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ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	——	3.60
PDA-10	lb.	.39	.41
Permalux	lb.	——	2.17
Santoflex AW	lb.	.75	.82
B	lb.	.50½	.57½
BX	lb.	.62	.69
35	lb.	.69½	.76½
Santovar-A	lb.	1.50	1.57
O	lb.	1.30	1.37
Santowhite Crystals	lb.	1.60	1.67
Santowhite L	lb.	.50½	.57½
MK	lb.	1.29	1.36
S.C.R. (tons)	lb.	.32	.34
Sequestrene AA	lb.	——	1.00
NA2	lb.	——	.82
NA3	lb.	——	.80
Stabilite	lb.	.53	.55
Alba	lb.	.72	.77
L	lb.	.60	.62
White	lb.	.53	.55
Stabilizer No. 1	lb.	——	1.55
Stabilizer No. 9-A	lb.	.80	1.05
Styphen I	lb.	.49½	.54½
Sunolite	lb.	.21	.23
Tannic Acid, Tech.	lb.	.46	.48
Thermoflex A	lb.	.98	1.00
V-G-B	lb.	.67	.69
Wing-Stay S	lb.	.49½	.50½

ANTI-SCORCHING AGENTS

Armeen HT	lb.	.34	.42
Benzoic Acid—Tech.	lb.	——	.43
Good-rite Vultrol	lb.	.60	.62
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

Arquad S	lb.	.22	.25
Formaldehyde (dms.)	lb.	.066	.071
G-4 (bbls.)	lb.	1.04	1.19
G-11	lb.	2.60	2.75
Nuodex 100 S.S. (dlvd.)	lb.	——	1.10
Nuodex 100 W.D. (dlvd.)	lb.	——	1.25
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	.24	.28
Ortho Cresol (26°-27°)	lb.	——	.201
Retarder D	lb.	.42	.50
Soligen Drier—Copper 8% (dms.)	lb.	.20¼	.21½
Zinc 8% (dms.)	lb.	.22¼	.23½
Vancide	lb.	——	.80

ANTI-WEEPING AGENTS (for Latex)

Webnix 34	lb.	1.50	2.25

AROMATICS (DEODORANTS)

Airkem 115	gal.	——	6.50
122	gal.	——	6.50
186	gal.	——	6.50
Alamask AA	lb.	——	3.00
AD	lb.	——	2.00
AF	lb.	——	2.50
AO	lb.	——	1.50
AR	lb.	——	.50
BG	lb.	——	1.15
BGM	lb.	——	.60
BW	lb.	——	1.85
BWM	lb.	——	2.00
CY	lb.	——	2.40
DL	lb.	——	1.95
H	lb.	——	5.50
LD	lb.	——	.75
LF	lb.	——	4.90
ND	lb.	——	2.75
O	lb.	——	6.50
OS	lb.	——	5.25
Bouquet 149	lb.	——	3.00
Coumarin	lb.	2.95	3.00
Curodex 19	lb.	4.75	4.90
188	lb.	5.75	5.90
198	lb.	6.75	6.90
Deodorant 65	lb.	——	1.85
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Deodorant Oil GD 3427	lb.	1.70	2.00
GD 6422	lb.	2.00	2.50
GD 6423	lb.	1.60	1.90
GD 6575	lb.	2.45	2.95
GD 31063	lb.	2.65	3.15
Latex Perfume 5	lb.	——	3.25
6	lb.	——	7.50
9	lb.	——	.65
Naugarones (dms.)	lb.	.60	3.00
Neutroleum Delta	lb.	——	2.60
Gamma	lb.	——	3.60
Parador A	lb.	1.95	2.25
C	lb.	2.75	3.25
E	lb.	.25	.55
GD 5280	lb.	2.00	2.50
GD 5348	lb.	1.90	3.25
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	.60	3.80
Rubber Perfume 12	lb.	——	2.85
Russian Leather 7	lb.	——	4.35
Vanillin	lb.	3.00	3.05

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	7.00
Blowing Agent CP-975	lb.	——	.35
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.10
Sponge Paste	lb.	——	.20
TDI	lb.	4.00	5.00
Unicel	lb.	——	.82
ND	lb.	——	.86
S	lb.	——	.20
Urea	lb.	.04¼	.04¾

BONDING AGENTS

Braze	gal.	6.00	7.50
Durez 12987	lb.	.48	.53
Kalabond	gal.	6.50	7.75
MDI	lb.	4.00	5.00
50	lb.	2.00	2.50
Penacolite B1A	lb.	——	.88
Pliobond 20	gal.	2.91	4.23
30	gal.	3.65	4.97
Reanite	gal.	6.75	7.25
Rex Compounds	gal.	1.30	2.85
Thixons	gal.	3.30	9.00
Ty-Ply Q (BN & S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.09	.11
Calcium Nitrate, Tech. Crystals	lb.	.07	.11½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.084
Zinc Nitrate, Tech.	lb.	——	.22½

COLORING AGENTS

Black

Aquablak B (also M, R)	lb.	.08	.11¼
Aquablak S	lb.	.11	.11½
Black Shield 4-35 (dms.)	lb.	——	.0825
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.11¾	.12
Pure Black Iron Oxide	cwt.	11.75	12.00

Blue

Blue GD, Dispersed	lb.	——	4.55
Cooke M.B. Blue	lb.	2.45	2.85
Milori Blue	lb.	——	.45
Monastral Fast Blue CPL	lb.	——	1.77
PCD, Dispersed	lb.	——	2.50
Peacoline Blue	lb.	——	3.85
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	——	1.70
Syntheline Blue	lb.	——	3.85
Stan-Tone MBS	lb.	1.55	4.55
GPE	lb.	——	2.50
LPC	lb.	——	4.05
PC	lb.	——	2.40
PDS	lb.	——	2.00
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	.90	2.65
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.11¾	.12
Mapico Brown (50 lb. bags)	lb.	.12¾	.13

Green

Cooke M.B. Green	lb.	1.45	3.20
Filo Green	lb.	——	.32
Green Chromium Oxide, Pure	lb.	——	.38
Green Chromium Oxide, Pure, Hydrated	lb.	——	1.05
Green FD, Dispersed	lb.	——	1.85
Monastral Fast Green GSD, Dispersed	lb.	——	3.20
GSL	lb.	——	1.97
Permanent Green CP-594	lb.	——	1.35
Pigment Green B	lb.	——	1.35
GL-652D	lb.	.80	.85
Ramapo Green	lb.	——	4.00
Rubber Green X-1292	lb.	——	1.15
Stan-Tone MBS	lb.	1.75	3.60
GPE	lb.	——	3.00
LPC	lb.	——	4.60
PC	lb.	——	3.00
PDS	lb.	1.90	2.20
Vansul Green M.B.	lb.	1.05	3.05

Maroon

Stan-Tone MBS	lb.	——	3.50
LPC	lb.	——	2.90
Vansul Maroon M.B.	lb.	1.05	2.80

Orange

Molybdate Orange	lb.	——	.44
Orange OD, Dispersed	lb.	——	2.75
Rubber Orange X-2065	lb.	——	3.00
Stan-Tone MBS	lb.	1.25	2.75
GPE	lb.	——	1.20
LPC	lb.	.70	3.35
PC	lb.	——	1.05
PDS	lb.	——	1.20
Vansul Orange M.B.	lb.	2.25	2.60

COLORING AGENTS (Cont'd)

Red

Antimony Trisulfide	lb.	.72	.78
R. M. P. Sulfur Free	lb.	——	.78
R. M. P. No. 3	lb.	——	.72
Cadmium Red	lb.	.95	1.25
Cadmolith Red (bbls.)	lb.	1.75	2.00
Cooke M.B. Red	lb.	.95	3.15
Graphic Red (dlvd.)	lb.	——	.85
Indian Red, American, Pure	lb.	.12¼	.12½
Doxco (English)	lb.	.11½	.11¾
Mapico Reds (50 lb. bags)	lb.	.12¼	.12½
Oximony Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	lb.	.12¼	.12½
Red PBD, Dispersed	lb.	——	1.75
2BD, Dispersed	lb.	——	1.80
2BL	lb.	——	1.32
PBL	lb.	——	1.65
Rubanox Red CP-762 (dlvd.)	lb.	——	1.40
Rubber Red CP-339 (dlvd.)	lb.	——	1.10
Rubber Red X-1148	lb.	——	.79
Rubbered	lb.	.11½	.11¾
Solfast Red	lb.	1.40	1.95
Stan-Tone MBS	lb.	1.20	4.00
GPE	lb.	1.65	2.00
LPC	lb.	1.05	2.20
PC	lb.	1.45	2.40
PDS	lb.	1.40	1.55
Sun Burnt Red	lb.	.11½	.11¾
Vansul Red M.B.	lb.	.95	3.40
Watchung Red	lb.	1.90	2.00

White—Lithopone

Albalith	lb.	.0750	.0850
Cryptone BT	lb.	.10	.11
Eagle-Picher	lb.	.0750	.0825
Permolith	lb.	.0790	.0890
Ponolith	lb.	.0750	.0825
Sunolith	lb.	.0750	.0825

White—Titanium Pigments

Ti-Cal	lb.	.08	.08¾
Ti-Pure	lb.	.21	.24
Titanox A—all grades (dlvd.)	lb.	.21	.22
RA (dlvd.)	lb.	.23	.24
RA-10 (dlvd.)	lb.	.23	.24
RA-NC (dlvd.)	lb.	.23	.24
RC (dlvd.)	lb.	.08¼	.08¾
RC-HT (dlvd.)	lb.	.08	.08½
Unitane O-220	lb.	.195	.205
OR-250	lb.	.215	.225
Zopaque	lb.	.21	.22
R	lb.	.23	.24

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 23, 44, 55)	lb.	.1400	.1500
Eagle-Picher AAA	lb.	.1400	.1500
Horse Head Special	lb.	.1425	.1525
XX	lb.	.1400	.1500
XX-505	lb.	.1550	.1650
Protox 166	lb.	.1400	.1500
167	lb.	.1400	.1500
St. Joe Black Label	lb.	.1400	.1500
Green Label	lb.	.1400	.1500
Red Label	lb.	.1400	.1500

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	13

White—Zinc Oxide (French Process)

Florence Green Seal	lb.	.1575	.1675
Red Seal	lb.	.1525	.1625
White Seal	lb.	.1625	.1725
Kadox 25	lb.	.1625	.1725
Kadox 15, 17 and 72	lb.	.1400	.1500
Protox 168	lb.	.1400	.1500
169	lb.	.1400	.1500
U. S. P.	lb.	.1725	.1825

White—Zinc Sulfide

Cryptone ZS	lb.	.2530	.2630

Yellow

Benzidine Yellow	lb.	1.91	2.15
Cadmolith Yellow (bbls.)	lb.	——	1.20
Chrome Yellow	lb.	——	.31
Cooke M.B. Yellow 405	lb.	——	1.70
Iron Oxide, Pure	lb.	.10	.10¼
Mapico Yellow (50 lb. bags)	lb.	.1000	.1025
Rubber Yellow X-1940	lb.	——	1.91
Stan-Tone MBS	lb.	1.30	4.50
GPE	lb.	——	4.50
LPC	lb.	——	2.25
PC	lb.	.85	4.50
PDS	lb.	1.25	1.75
Toluidine Yellow YL-660 D	lb.	1.15	1.20
Oximony Iron Oxide	lb.	——	.0614
Vansul Yellow M.B.	lb.	1.05	1.85
Yellow GD, Dispersed	lb.	——	2.15
GL	lb.	——	1.62
Zinc Yellow	lb.	——	.25

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DISPERSING AGENTS

Anchoid*	lb.	.24	.25
Armeen 18	lb.	.42	.50
Blancol Conc. Powder	lb.	.15½	.17½
Darvan No. 1 (and No. 2)	lb.	.22	.30
Daxad 11 (21, 23)	lb.	.08	.35
Dispersaid	lb.	1.25	1.35
Emcol K-8300 (dms.)	lb.	.19	.20
Furala	lb.	.06½	.07½
Halloid	lb.	.04½	.05½
Lomar PW	lb.	—	.16
Marasperse C	lb.	.06½	.06¼
CB	lb.	.12¼	.13¼
N	lb.	.09½	.10½
Modicol C	lb.	.08	.12
Rubbex	lb.	.267	.285
Stablex B	lb.	.50	.95
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	—	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Trenamine D-25	lb.	.32½	.36
Triethanolamine (drums) (dlvd.)	lb.	.24½	.27¼
Yelkin TT	lb.	.13	.17
Zinsper	lb.	—	.15

EXTENDERS

Advagum 1098	lb.	—	.64
Arcco 1071-13B	lb.	.14½	.15½
1073-18B	lb.	.13½	.14½
1294-36B	lb.	.11½	.12½
Bunaweld Polymer No. 780	lb.	—	.22
No. 5514	lb.	—	.35
D-93 (and D-93) (dms.)	lb.	—	.12
Car-Bel-Ex-A and B	lb.	—	.14
Extender 600	lb.	—	.1480
Polyco 418	lb.	.17	.18
PR-162 Latex Extender	gal.	—	1.55
Synprolac	lb.	.16	.23
Synprowax	lb.	—	.23
Vistanex	lb.	—	.45

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.19¾	1.30
Lionite	lb.	.14	1.20
Pumice	lb.	.03	.05
Aluminum Hydrate	lb.	.07	.10
Aluminum Silicate			
Marter White	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	95.50	100.00
Barytes			
No. 1 Floated, White	ton	37.85	53.60
No. 2 Floated, Unbleached	ton	35.85	51.60
No. 22 Barytes (c.l.)	ton	—	20.00
Foam A	ton	—	37.60
Bentonite (c.l.)	ton	—	12.50
Argosite Clay (c.l.)	ton	—	12.50
Bennett Clay (c.l.)	ton	—	32.50
SPV Volclay (c.l.)	ton	—	12.50
White Hi-Gel	ton	—	65.90
Blanc Fixe	ton	72.50	120.00
Calcium Carbonate			
Atomite (c.l.)	ton	—	30.00
B.I. White No. 1 (c.l.)	ton	—	7.50
B.I. White No. 2 (c.l.)	ton	—	7.00
Blue Star XX	ton	—	15.50
Calcene NC	ton	72.50	92.50
TM	ton	75.00	95.00
Calwhite	ton	—	17.00
Camelwite	ton	—	30.00
Duramite	ton	—	15.00
Gamaco	ton	—	30.00
Kalite (c.l.)	ton	—	50.00
Laminar	ton	—	30.00
Lesamite (c.l.)	ton	—	27.50
Millical (c.l.)	ton	—	32.50
Multifex	ton	—	120.00
M	ton	—	110.00
Non-Fer-Al	ton	—	25.00
Purecal M	ton	51.75	66.75
SC	ton	110.00	125.00
T	ton	110.00	125.00
U	ton	120.00	135.00
Rambo No. 1	ton	—	11.00
Sierracal	ton	15.00	18.50
Snowflake	ton	17.00	18.00
Super Multifex	ton	—	160.00
Surfex (c.l.)	ton	—	35.00
Suspenso (c.l.)	ton	—	30.00
Witcarb B	ton	51.75	66.75
P	ton	110.00	125.00
R	ton	120.00	135.00
R-12	ton	46.50	66.75
York White	ton	—	9.50
Calcium Silicate			
Silene EF	ton	120.00	140.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	—	20.50
Calcium Sulfate, Hydrous			
Terra Alba No. 1	ton	12.00	14.40
Chalk Whiting (l.c.l.)	lb.	.0150	.0175
Recco Paris Whiting	ton	—	33.00
Clay			
Aiken Clay	ton	—	14.00
Alsilite (c.l.)	ton	20.00	45.00
Alsite (c.l.)	ton	—	14.00
Aluminum Flake	ton	18.00	60.00
Buca (c.l.)	ton	—	45.00

FILLERS (Cont'd)

Clay (cont'd)

Burgess No. 20	ton	—	35.00
No. 30	ton	—	37.00
Burgess Iceberg	ton	—	50.00
Catalpo (c.l.)	ton	—	35.00
Champion	ton	—	14.00
C.S.D. (c.l.)	ton	—	13.50
Crown	ton	—	14.00
Dixie (c.l.)	ton	—	14.00
Franklin Clay (c.l.)	ton	—	13.50
Harwick Clays	ton	15.50	50.00
Hi-White R	ton	—	13.50
Hydratex R	ton	—	28.00
Kaolloid Clay (c.l.)	ton	—	10.50
McNamee (c.l.)	ton	—	13.50
Paragon	ton	—	13.50
Pigment 5	ton	22.50	36.00
Pigment 22	ton	18.00	22.50
Pigment 33	ton	—	37.00
Recco (c.l.)	ton	—	14.00
Snobrite	ton	—	12.50
Suprex	ton	—	14.00
Whitetex (c.l.)	ton	—	50.00
Windsor Clay (c.l.)	ton	—	14.00
Diatomaceous Earth	ton	30.00	50.00
Kaylorite (c.l.)	ton	—	30.00
Lorite	ton	—	30.00
Flock			
Cotton, white and colored	lb.	.13	.32
Filfloc F 40-9000	lb.	—	.16
Filfloc F 6000	lb.	—	.40
Polycel	ton	110.00	210.00
Rayon, bleached or dyed	lb.	.82	1.25
Rayon, grey	lb.	—	.18
Rayon, pink	lb.	—	.18
Solka-Floc (l.c.l.)	lb.	.07	.16
Glue, Bone (dlvd.)	lb.	.18	.20½
Leather, Shredded	lb.	.05	.17
Lignin	lb.	.03	.06
Indulin	lb.	.09	.10
Limestone, Pulverized	ton	3.00	4.75
Georgia Marble No. 10	ton	—	10.00
Industrial Filler No. 100	ton	—	5.75
Micro Velva	ton	45.00	48.00
Velvet Filler, Superfine	ton	—	27.00
Magnesium Carbonate	lb.	.0950	.1050
K & M Clearcarb	lb.	.1225	.1275
Magnesium Oxide	lb.	.05	.06
Magnesium Silicate	ton	18.00	35.00
Airex	ton	25.00	27.00
Asbestol Regular	ton	—	25.00
Blue Star Talc	ton	—	23.00
French Talc	ton	—	59.00
L.S. Silver	ton	—	26.50
Sierra White	ton	18.75	21.25
Soapstone	ton	—	9.90
No. 367 Talc	ton	—	13.00
Mica	lb.	.01¼	.07¼
Concord	lb.	.07	.07¼
Micro-Mica	lb.	.06¾	.07½
Mineralite (c.l.)	ton	30.00	85.00
Silversheen	lb.	.07¼	.08
Triple A Mica (c.l.)	ton	—	25.00
Vermiculite	lb.	—	.11
Wet Ground Biotite Mica	lb.	.05½	.06¼
Wet Ground Mica No. 160	lb.	.07	.07¼
Pyrophyllite			
No. 261	ton	—	11.50
Pyrax A (c.l.)	ton	—	13.50
WA (c.l.)	ton	—	16.00
Sawdust, Graded	ton	14.00	35.00
Silica	ton	16.00	27.00
Blue Star	ton	—	20.60
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Lo-Micron Slate Flour	lb.	—	.04½
No. 133 Slate Flour	ton	—	4.55
Talc, Domestic	ton	10.00	27.00
No. 1600	ton	—	70.60
No. 1768	ton	—	13.00
Nytal 200	ton	—	25.00
300	ton	—	36.00
Walnut Shell Flour	ton	45.00	111.00
Stan-Shell	ton	63.00	126.00
Whiting, Commercial	ton	—	7.00
Camel-Carb	ton	—	10.00
C-C-O White	ton	—	18.00
Georgia Marble No. 15	ton	—	15.00
No. 16	ton	—	16.00
Keystone (c.l.)	ton	—	16.00
Snowflake (c.l.)	ton	—	18.00
Stan-White 325	ton	8.50	11.10
Veroc (c.l.)	ton	—	8.50
Welco (c.l.)	ton	—	8.50
York White R (c.l.)	ton	—	8.50
Wood Flour	ton	24.00	48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	2.10	2.35
Black Out	gal.	4.50	8.00
Shellac, Orange Gum	lb.	.30	.40
VanWax	gal.	1.45	1.50

FLAME RETARDANTS

Chlorowax 70	lb.	.18	.19
Halowax	lb.	.27	.42
Zinc Borate 3167	lb.	.1920	.2020
Zyrox	lb.	.49	.78

LUBRICANTS, MOLD

Aquadag	lb.	3.50	4.00
Aquarex D	lb.	—	.80
L	lb.	—	.94
ME	lb.	—	.97
MDL	lb.	—	.33
WAQ	lb.	—	.28
Akro Gel	lb.	—	.165
Borax, Granular (l.c.l.)	ton	81.00	86.00
Carbowax 4000	lb.	.33	.34
CD Mold Release A	gal.	—	7.00
Colite Concentrate (dms.)	gal.	—	.90
Concentrex	lb.	—	.25
D.C. 7 Compound	lb.	5.13	6.50
D.C. Emulsion No. 7	lb.	1.59	2.07
No. 8	lb.	1.46	1.98
No. 35	lb.	1.46	3.50
No. 35A	lb.	1.46	3.50
No. 35B	lb.	1.46	3.50
D.C. Mold Release Fluid	lb.	3.70	6.00
Dipex	lb.	.14	.18
Dri-Lube	lb.	—	.22
Glydag	lb.	1.30	2.00
Hawkeye Flake (dlvd.)	lb.	.08¼	.10¼
Kokobace	lb.	—	.12
Lubrex	lb.	.25	.30
Lubri-Flo	gal.	10.00	12.00
Migralube	lb.	—	.35
Mold Lubricant No. 72 Conc.	gal.	2.50	4.00
No. 735	gal.	1.26	2.75
No. 769	gal.	1.20	2.60
No. 880	gal.	1.12	2.50
No. 856	gal.	2.00	4.00
Moldeze No. 3	gal.	5.00	6.00
Mold-Brite	gal.	—	1.50
Mold-Slick	lb.	.253	.271
Mold-White	gal.	—	2.00
Monopole Oil MD	lb.	—	.23
Nopcolube	lb.	—	.15
Orvus WA Paste (dms.)	lb.	—	.25
Prodag	lb.	.28	.42
Purity Flake (dlvd.)	lb.	.11	.14
Rubber-Flo	gal.	1.25	1.60
Rubber-Glo	gal.	—	.94
Rusco Mold Paste	lb.	—	.25
Sericite (l.c.l.)	ton	65.00	75.00
Thermalube	lb.	—	.13¾
Ucon Lubricants	lb.	.26½	.35
Ulco Mold Soap	lb.	.12	.23

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	.38
Emcol DS-50	lb.	—	.38
RDH-5	lb.	—	.30
Extrud-o-Lube	gal.	—	1.54
G.B. Naphthenic Neutrals	gal.	.11	.18
Latex-Lube GR (dlvd.)	lb.	.19¼	.20
Pigmented (dlvd.)	lb.	.18¾	.19¾
RS	lb.	—	.16½
Liqui-Lube (dlvd.)	lb.	—	.16¼
NF (dlvd.)	lb.	—	.16¾
NT (dlvd.)	lb.	—	.16¾
Propylene Stearate (dms.)	lb.	.68	.78

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.37	.39
Calcium Stearate	lb.	.35	.37
D.C. 4 Compound	lb.	5.13	6.50
D.C. 200 Fluid	lb.	3.70	6.00
Glycerized Lubricant	gal.	—	1.48
Hydro-Zinc	lb.	—	.20
Polyethylene Glycol	lb.	.26½	.29
Rexanol	lb.	—	.17
Separex	lb.	—	.25
Stock-Lube	lb.	—	.19
Slab-Dip	lb.	—	.15
Wet-Zinc	lb.	—	.22¼
Zinc Stearate	lb.	.37	.39
Z.S.D. Dispersion	lb.	—	.20

MOLD CLEANERS

Actusol (dlvd.)	gal.	1.45	1.65
Alkon (dlvd.)	lb.	.16	.16½
Metso 99	cwt.	4.25	6.50
Metso Granular	cwt.	3.80	6.05
Rubber-Sol	gal.	2.97	3.97
Shelblast	ton	80.00	165.00
Sprex A.C. (dlvd.)	lb.	.17¾	.18¾

PEPTIZING AGENTS

Peptizer P-12	lb.	.95	1.25
Pepton 22 Plasticizer	lb.	.74½	.77½
RPA 2	lb.	—	.77½
3	lb.	—	.47½
3 Conc.	lb.	—	.97
3-RO	lb.	—	.50½
5	lb.	—	.59

PLASTICIZERS & SOFTENERS

AA (dms.)	lb.	.25	.26½
Acto 500	lb.	—	.09
Adipol BCA (dms.)	lb.	.44½	.45
2EH	lb.	.44¾	.45¼
10A	lb.	.44¾	.45¾
ODY	lb.	.51¾	.52¼
American Pine Tar	lb.	.0410	.0678
Arneel	lb.	.22	.27
Arolene 1980 (c.l.)	lb.	—	.10

For NEOPRENE COMPOUNDING

MAGLITE-M*

- Better acid acceptance
- Better anti-scorch properties
- Better uncured stock life
- Safer tubing at higher die termperatures
- Faster tubing and wire covering
- Better molding characteristics
- Excellent curing aid

MAGLITE-D*

Has all the advantages of MAGLITE-M with these added characteristics

- Greater bulking factor per cubic foot
- Higher magnesium oxide content
- Easier incorporation into neoprene
- Less dust

*Magnesium oxides produced by Marine Magnesium Corporation from sea water by patented processes.

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"The Talc House"

OTHER PRODUCTS FOR THE RUBBER INDUSTRY
PUMICE
ELK BRAND ANTIMONY OXIDE

WHITTAKER CLARK & DANIELS, INC.
260 West Broadway
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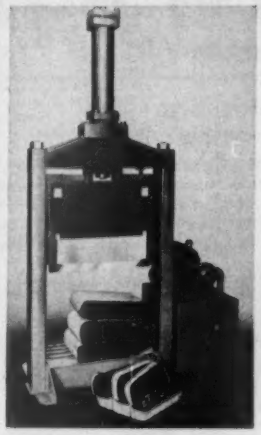
CRUDE RUBBER BALE CUTTER



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Fully Assembled
Hydraulic
Operation
High Production

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An efficient machine of simple design for cutting bales of crude, synthetic and reclaimed rubber or similar materials. Cuts without aid of water or other lubricant. One man operation—safety control.

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ORIGINAL PRODUCERS OF MAGNESIUM SALTS FROM SEA WATER

Magnesium salts from the sea

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MAGNESIUM
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FOR THE RUBBER INDUSTRY

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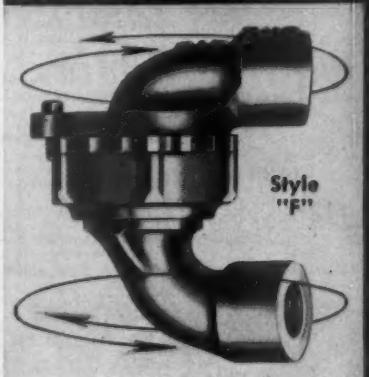
FLEXO JOINTS

for pipe lines that *move!*



For unrestricted flow of steam, air, or fluids through moving pipe lines or to equipment in motion.

Complete 360° swing. The strength of pipe with the flexibility of hose. Only four parts assure long wear, low maintenance. No springs, small or loose parts. Four styles in standard pipe size, ¼" to 3".

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In Canada: S. A. ARMSTRONG, Ltd., 1400 O'Connor Dr., Toronto 13, Ont.

PLASTICIZERS & SOFTENERS (Cont'd)

Aromatic Tar	gal.	.0573 -	.1973
Bardol	lb.	.02¾ -	.03¾
B	lb.	.06¼ -	.06½
Bayol D	gal.	—— -	.382
F	gal.	—— -	.52
Beeswax, Bleached	lb.	.85 -	.90
Yellow Refined	lb.	.70 -	.75
Bondogen	lb.	.55 -	.60
B.R.C. No. 20	lb.	.0150 -	.0175
B.R.H. 2	lb.	—— -	.0213
BRS 700	lb.	.02 -	.0285
B.R.T. 3	lb.	.0255 -	.0265
4	lb.	.0250 -	.0260
7	lb.	.03 -	.031
B.R.V.	lb.	.0475 -	.0565
Bunarex Resins	lb.	.06½ -	.07½
Bunatak AH	lb.	.08 -	.09
U	lb.	—— -	.17½
No. 90	lb.	—— -	.09
No. 210	lb.	—— -	.14
Burgundy Pitch	lb.	.0843 -	.0888
Butac	lb.	.11¾ -	.12¾
Butoxyethyl Diglycol Carbonate	lb.	.40 -	.41
Butyl Benzyl Sebacate	lb.	.61 -	.63¾
Butyl Carbitol Perlargonate (dms.)	lb.	—— -	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	—— -	.68
Butyl Palmitate	lb.	—— -	.27½
Butyl Roleate	lb.	.176 -	.18
Butyl Stearate-CP (dms.)	lb.	.27¼ -	.28¾
BWH-1	lb.	—— -	.14
Cabflex DCP (dms.)	lb.	.36¼ -	.37¾
DDA (dms.)	lb.	.47¼ -	.48¾
DDP (dms.)	lb.	.39¼ -	.40¾
Di-BA (dms.)	lb.	.41 -	.42
Di-OA (dms.)	lb.	.44¾ -	.45¾
Di-OP (dms.)	lb.	.38¾ -	.39¾
Calflux 510, 550	lb.	.02½ -	.03¼
G.P.	lb.	.0125 -	.02
R-100	lb.	.04½ -	.05¼
TT	lb.	.02 -	.02¾
Candelilla Wax Prime	lb.	.75 -	.78
Capryl Benzyl Sebacate	lb.	.67½ -	.70¼
Carbonex	lb.	.0325 -	.0375
S Flakes	lb.	.04¾ -	.05
S Plastic	lb.	.0410 -	.0460
644	lb.	.0375 -	.0425
Carbowax 4000 (drums)	lb.	.33 -	.34
Cardolite 615	lb.	.33¾ -	.36¾
816	lb.	25¾ -	.28¾
Carnauba Wax, Crude	lb.	.98 -	1.10
Refined	lb.	1.05 -	1.10
Yellow	lb.	1.30 -	1.35
Castorwax	lb.	.3260 -	.3380
Celluflex (dms.)	lb.	.34¾ -	.35¾
Ceresine Wax	lb.	.14 -	.26
Chlorowax 40	lb.	.14 -	.14¾
Contogum	lb.	.06¾ -	.10⅛
CTLA Polymer	gal.	.20 -	.36
Cumar Resins	lb.	.05½ -	.14½
D.B.M.	lb.	—— -	.30
Degras, Common	lb.	.11 -	.14½
Diallyl Phthalate (dms.)	lb.	.51 -	.52
Dibenzyl Sebacate	lb.	.74 -	.76¼
Dibutoxethyl Sebacate	lb.	—— -	.5634
Dibutyl Phthalate	lb.	.35¼ -	.36¾
Dibutyl Sebacate	lb.	.80 -	.82¾
Dicapryl Adipate	lb.	.40½ -	.43½
Dicapryl Phthalate	lb.	.36¾ -	.37¾
Dicapryl Sebacate	lb.	.66¾ -	.67¾
Di-Carbitol Phthalate (dms.)	lb.	.42 -	.42½
Dicyclohexyl Phthalate	lb.	—— -	.42
Diethyl Phthalate (t.c.)	lb.	.25 -	.27¾
Di-2-ethylhexyl Phthalate (t.c.)	lb.	—— -	.37
Dihexyl Adipate	lb.	.40¾ -	.41¾
Dihexyl Phthalate	lb.	.36¾ -	.37¾
Dihexyl Sebacate	lb.	.73¾ -	.74¾
Diisobutyl Azelate	lb.	.54 -	.57
Di-iso-octyl Adipate (dms.)	lb.	.44¾ -	.45¾
Di-iso-octyl Phthalate (t.c.)	lb.	.38¾ -	.49¾
Dimethyl Phthalate (c.c.)	lb.	.27½ -	.30¼
Dimethyl Sebacate	lb.	1.26¾ -	1.27¾
Dinopol	lb.	.39¾ -	.40¾
Dioctyl Phthalate (dms.)	lb.	.38¾ -	.39¾
Dioctyl Sebacate (dms.)	lb.	.71 -	.73¾
D.T.O.P. (dms.)	lb.	.38¾ -	.39¾
Dipolymer Oil	gal.	—— -	.33
Dispersing Oil No. 10	lb.	.06 -	.06¼
Dutrex B	lb.	.02¾ -	.03¾
5 and 6	lb.	.020 -	.031
15E	gal.	.10 -	.20
20, 21, 22 and 25	lb.	—— -	.04
Elastex 10-P	lb.	.40 -	.42½
10-B	lb.	.34½ -	.37
DCHP	lb.	.42½ -	.43½
Estac	lb.	—— -	.16
Ethox (dms.)	lb.	.45¼ -	.45¾
Flexol B-400	lb.	.28 -	.30
DOP	lb.	.37 -	.39¼
TOF	lb.	.46 -	.48¾
3GH	lb.	.44 -	.46
3GO	lb.	.53 -	.55
4GO	lb.	.35 -	.37¼
8HP	lb.	.36 -	.38¾
Flexricin P-1	lb.	.34¼ -	.36
P-4	lb.	.33¼ -	.35
P-4C	lb.	.43¾ -	.45½
P-6	lb.	.38¼ -	.40
P-8	lb.	.33¾ -	.35
Pale 4	lb.	.27 -	.28½
PG-16	lb.	.38¼ -	.40
Fortex (dms.)	lb.	.12½ -	.14½

PLASTICIZERS & SOFTENERS (Cont'd)

Galex W-100	lb.	.15½ -	.19¼
G. B. Light Process Oil	lb.	.025 -	.0325
Medium Process Oil	lb.	.03½ -	.04¼
G. B. Naphthenic Neutrals	gal.	.11 -	.18
Good-Rite GP233	lb.	.43 -	.45¾
GP261	lb.	.37 -	.39¾
Harflex 500 (dms.)	lb.	.37¾ -	.38¾
Herron-H.T.	gal.	.16 -	.27
Herron-Plas	lb.	—— -	.03¾
Herron-Wax	lb.	.05¼ -	.06
No. 23	lb.	.08¼ -	.08¾
No. 24	lb.	.07¼ -	.07¾
HSC No. 13	lb.	.27 -	.30
Hylene B	lb.	.45 -	.50
C	lb.	.41 -	.46
D	lb.	.47½ -	.52½
Indonex 632½ (633½, 634½, 637½)	gal.	.11 -	.17
Kapsol	lb.	.34 -	.35
Kenflex	lb.	.18 -	.27
Kessoflex 101 (dms.)	lb.	—— -	.39
102 (dms.)	lb.	—— -	.32½
103 (dms.)	lb.	—— -	.41½
104 (dms.)	lb.	—— -	.48
105 (dms.)	lb.	—— -	.33¼
106 (dms.)	lb.	—— -	.35½
KP 23 (dms.)	lb.	.31 -	.32
70 (dms.)	lb.	.37¾ -	.38¼
90 (dms.)	lb.	.46¾ -	.47¾
120 (dms.)	lb.	.52 -	.52½
140 (dms.)	lb.	.47¾ -	.48¼
201 (dms.)	lb.	.54¾ -	.55¼
220 (dms.)	lb.	.34¾ -	.35¼
504 (dms.)	lb.	.35¾ -	.36¼
555 (dms.)	lb.	.33 -	.33½
Kremol 40	gal.	.36 -	.46
50	gal.	.39 -	.49
Kronisol (drums)	lb.	.37¾ -	.38¼
Kronitex AA (dms.)	lb.	.34¾ -	.35¾
I (dms.)	lb.	.34¾ -	.35¾
Lanolin, Tech. Anhydrous	lb.	—— -	.31
Lead Oleate	lb.	—— -	.30½
Lindol (dms.)	lb.	.34¾ -	.35¾
2-Mercaptoethanol (drums)	lb.	1.25 -	1.50
Methox (dms.)	lb.	.41¼ -	.41¾
Methyl Laurate	lb.	.25 -	.27
Methyl Oleate	lb.	—— -	.20
Methyl Stearate (dms.)	lb.	—— -	.30
Modicol G	lb.	—— -	.23
R	lb.	—— -	.17
Montan Wax, Crude	lb.	.14 -	.15
Monten Wax	lb.	—— -	.30½
Morflex	lb.	.35 -	.51¾
Natac	lb.	.11¼ -	.12¼
Nebony Resins (dms.)	lb.	.04 -	.04½
Neolene 210 (t.c.)	lb.	—— -	.16
212 (t.c.)	lb.	—— -	.14
220 (t.c.)	lb.	—— -	.15
Nerium	lb.	—— -	.09
Nevillac Resins (dms.)	lb.	.28 -	.55
Neville Resins (dms.)	lb.	.12 -	.18
Nevindene Resins (dms.)	lb.	.15 -	.18
Nevinol (dms.)	lb.	—— -	.20
Nuba 1 (and 2) (dms.)	lb.	.05¾ -	.06¼
3X (dms.)	lb.	.07¾ -	.08¼
15 (and 30) Oil (dms.)	lb.	.36¼ -	.38
No. 480 Oil Proof Resin	lb.	—— -	.18
Ohopex Q10 (dms.)	lb.	.37¾ -	.38¼
R9 (dms.)	lb.	.37 -	.37½
Opalwax	lb.	.37 -	.38
Ortho-Nitrobiphenyl	lb.	.13 -	.15
Ozokerite Wax No. 64 White	lb.	.31 -	.32
Yellow	lb.	.25 -	.26
Palm Oil	lb.	—— -	.11
Paradene Resins (dms.)	lb.	.06½ -	.07½
Para Flux (dms.)	gal.	.1925 -	.2025
2016 (dms.)	gal.	.22 -	.23
Para Lube (l.c.l.)	lb.	.046 -	.048
Parmo	lb.	.06 -	.13½
Pepton 22 Plasticizer	lb.	.74½ -	.77½
Plasticizer ODN	lb.	.31 -	.37
Picco 10 (and 25)	lb.	—— -	.13½
75 (and 100)	lb.	—— -	.13
Rubber Resin 100	lb.	.1855 -	.1905
S.O.S.	gal.	—— -	.29
Piccocizer 30	lb.	—— -	.05½
Piccolastic A (and B, C, D, E)	lb.	.28½ -	.29
FT, FHF and FX	lb.	—— -	.1815
T-135	lb.	.22¾ -	.23¼
Piccolyte S Resins	lb.	.18½ -	.20
Piccolyte WW Resins	lb.	.45 -	.47
Piccoumaron Resins	lb.	.06¾ -	.17
Piccovar	lb.	.14½ -	.15
Piccovol	lb.	—— -	.02½
Pictar	gal.	—— -	.25
Pigmentar	lb.	.0410 -	.0678
Pigmentaroil	lb.	.0410 -	.0678
Plastac M	lb.	—— -	.09¼
Plasticizer 2286	lb.	—— -	.26¾
Plasticizer ODN	lb.	.31 -	.37
Plasticizer SC	lb.	.49 -	.52
Plasticizer W-13	lb.	.37 -	.38¼
Plasticizer XP-3	lb.	—— -	.50
Plastoflex 50	lb.	.34¼ -	.35¼
55	lb.	.33¼ -	.34¼
520	lb.	.37½ -	.38½
VS	lb.	.38¼ -	.39¼
Plastogen	lb.	.07¾ -	.08
Plastolein 9050 (c.l.)	lb.	.56 -	.59
9055	lb.	.35 -	.38
9058	lb.	.52 -	.55
9250	lb.	.27 -	.30
9715	lb.	.35 -	.38

PLASTICIZERS & SOFTENERS (Cont'd)

Plastone	lb.	.27 -	.30
Polycin 781	lb.	.30½ -	.31½
Polycizer 162	lb.	.37 -	.39¼
332	lb.	.43 -	.45¼
ED	lb.	—— -	.56¾
Polyco 438	lb.	.34 -	.36
Polymel C-130	lb.	.19½ -	.20½
D	lb.	.23½ -	.24½
6	lb.	.05¾ -	.07¾
Process Oil C-255 (c.l.)	gal.	—— -	.22
Propylene Stearate (dms.)	lb.	—— -	.32
PT 67 Light Pine Oil (dms.)	gal.	—— -	.60
101 Pine Tar Oil (t.c., dms.)	lb.	.0410 -	.0534
400 Pine Tar (600, 800) (t.c., dms.)	lb.	.0410 -	.0534
PX-104	lb.	.34 -	.42
PX-108	lb.	.38 -	.46
PX-208	lb.	.41½ -	.49
PX-404	lb.	.60 -	.68
Reogen	lb.	.13¼ -	.13½
465 Resin (dms.)	lb.	.07 -	.07½
Resin 731-C	cwt.	—— -	15.00
Resin C	lb.	.0225 -	.0310
Resinex	lb.	.03¼ -	.03¾
L-4	lb.	.02¼ -	.03
Rexflex	lb.	—— -	.15
Rosin Oil	gal.	.54 -	1.20
R.S.O. Softening Oil	lb.	.03 -	.05
Rubberol	lb.	—— -	.25¾
Rubtar	gal.	—— -	.40
Santicizer B-16	lb.	.52 -	.54¾
E-15	lb.	.51 -	.53¾
M-17	lb.	.48 -	.50¾
No. 107	lb.	.38¾ -	.39¾
No. 140	lb.	.33 -	.35¾
No. 141	lb.	.37 -	.39¾
No. 160	lb.	.31 -	.33¾
Sherolatum	lb.	.03½ -	.06
Softener No. 20	gal.	.09 -	.25
Staflex 1XA	lb.	.34 -	.36
Stanolind Petrolatum	lb.	.048 -	.086
Wax	lb.	.31 -	.32¾
Staybelite Resin (dms.)	cwt.	—— -	12.00
Sunny South Burgundy Pitch	lb.	.0980 -	.1025
Sunny South Pine Tar	lb.	.0410 -	.0678
Sunny South Rosin Oil	gal.	.58 -	.87½
Superla Wax	lb.	.27¾ -	.32
Syncera Wax	lb.	.19 -	.24
Syn Tac (c.l.)	gal.	—— -	.33
Synthetic Revertant Oil	lb.	—— -	.16
Tar, Refined	gal.	.12 -	.17
K-Tarnel NR (t.c.)	lb.	—— -	.0851
Terpene A	gal.	—— -	.65
TP-90B	lb.	—— -	.59
TP-95	lb.	—— -	.65
TP-98	lb.	—— -	.65
Triacetin	lb.	.34 -	.45
Tributyl Phosphate (dms.)	lb.	.51¼ -	.52¾
Tricresyl Phosphate (t.c.)	lb.	.33 -	.35¾
Turgum S	lb.	.10 -	.11
Vanadiset A	gal.	.13 -	.20
Vistac No. 1	gal.	1.00 -	1.21
P	lb.	.18 -	.18½
Vopcolene 50	lb.	—— -	.37
Witresin—Granular	ton	41.00 -	43.00
Solid	ton	36.00 -	38.00

PROCESSING AIDS

Calcium Riconoleate	lb.	—— -	.56
Castor Oil, Processed (dms.)	lb.	.27 -	.28½
Refined (dms.)	lb.	.3260 -	.3330
Dutrex 7	lb.	.12 -	.20
ELA	lb.	—— -	.82½
Emcol MAS	lb.	—— -	.44
Millrex	lb.	—— -	.15
Resin No. 510	lb.	.13½ -	.16½
Zyrox	lb.	.50 -	.79

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¼ -	.21
Alpha Protein	lb.	.24 -	.28
Ammonium Alginate	lb.	—— -	.95
Aroostoocrat	lb.	—— -	.07½
Carob Bean Flour	lb.	—— -	.46
Casein	lb.	.28 -	.38
Emcol K-8300 (dms.)	lb.	.19 -	.20
Ethylene Diamine 68%	lb.	.44 -	.47
Gum Arabic	lb.	—— -	.19
Karaya Gum	lb.	—— -	.28
Locust Bean Gum	lb.	—— -	.31
Prosein	lb.	.0600 -	.0630
Rex Compound No. 2801	lb.	—— -	.15
Stablex B	lb.	.50 -	.95
K	lb.	.27 -	.35

RECLAIMING AGENTS

Amalgamator Z-4		—— -	.33
Armeen C	lb.	.50 -	.58
T	lb.	.42 -	.50
No. 517 H.B. Oil	gal.	.11½ -	.16½
535	gal.	.22 -	.27
Burco RA	lb.	.05½ -	.08¼
C-6 Oil (and 28, 32)	gal.	.33 -	.38
C-10 Oil	gal.	.25 -	.30
C-33 Oil	gal.	—— -	.21½
Caustic Soda—Flake 76% (c.l., drums)	cwt.	—— -	3.75
Liquid 50% (t.c.)	cwt.	—— -	2.55
Solid 76% (c.l., dms.)	cwt.	—— -	3.35

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72-75% LATEX CONCENTRATE

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- Natural and Synthetic Latex Compounds
- Plastisols

RC PLASTICIZERS

- Dibutyl Phthalate — (DBP)
- Triethylene Glycol Dicaprylate — (TG-8)
- Di-iso-octyl Phthalate — (DIOP)
- Di-iso-octyl Adipate — (DIOA)
- Iso-octyl Palmitate — (O-16)
- Iso-octyl Iso-decyl Phthalate — (ODP)

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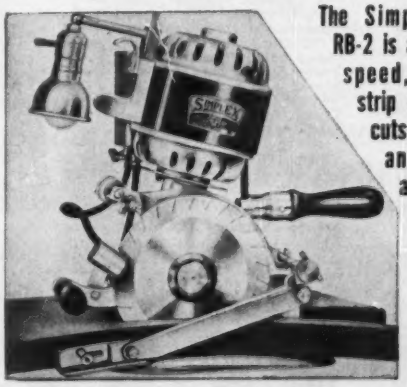
CUT 2500 FEET OF STRIP PER HOUR



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MAGNESIA

Oxides and Carbonates Light and Heavy—Tech. and U. S. P. Quality

Have you considered the advantages of Carey Pelletized Oxide of Magnesia packed in Polyethylene Bags—comparatively dust-free, with greater activity, longer package life?

THE PHILIP CAREY MFG. COMPANY
CINCINNATI 15, OHIO
Offices and Distributors in all Principal Cities

RECLAIMING AGENTS (Cont'd)

Cresylic Acid (99-100%)	gal.	.90 -	1.23
D-4	gal.	—— -	.27
E-5	gal.	—— -	.25
G. B. Reclaiming Oil	gal.	.12 -	.18
CD-10	gal.	.10 -	.16
CD-50-U	gal.	.18 -	.24
Gensol No. 6 (t.c.)	gal.	—— -	.45
Heavy Aromatic Naphtha	gal.	—— -	.12⅜
LX-77 Reclaiming Solvent	gal.	.21 -	.33
LX-572 Reclaiming Oil	gal.	.27 -	.32
LX-777 Reclaiming Oil	gal.	.23 -	.33
Neo Fat D-242	lb.	.05½ -	.07¾
PRR 1	gal.	.15 -	.35
PT 67 Light pine oil	gal.	.50 -	.60
PT 101 Pine tar oil	lb.	.0410 -	.0534
Q Oil	gal.	—— -	.286
Reclaiming Oil 1621	lb.	.03 -	.04
Reclaiming Oil 3186 (t.c.)	gal.	.28 -	.38½
Reclaiming Oil 3186-G	gal.	.25 -	.36½
Reclaiming Reagent No. 1431	lb.	.21 -	.25
R.P.A. No. 3	lb	—— -	.46
RR-10	lb.	—— -	.36
Soda Ash (c.l., bags)	cwt.	—— -	1.50
Solvent 534	gal.	.20½ -	.26½
Solvent Oil 21	gal.	.24 -	.29
C-42	gal.	.23 -	.28
Union Solvent 4060-O	gal.	—— -	.149
X-1 Resinous Oil	lb.	.0210 -	.0275

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0740 -	.1225
Continental F	lb.	.0740 -	.1225
Croflex	lb.	.0740 -	.1225
Dixiedensed (and S)	lb.	.0740 -	.1225
Kosmobile (and S)	lb.	.0740 -	.1225
Micronex HPC	lb.	.0740 -	.1225
Spheron 4	lb.	.0740 -	.1225
Witco Disperso No. 6	lb.	.0740 -	.1225

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0740 -	.1225
Continental A	lb.	.0740 -	.1225
Croflex TH	lb.	.0740 -	.1225
Dixiedensed HM (and S-66)	lb.	.0740 -	.1225
Huber Arrow TX	lb.	.0740 -	.1225
Kosmobile HM (and S-66)	lb.	.0740 -	.1225
Micronex Standard	lb.	.0740 -	.1225
Spheron 6	lb.	.0740 -	.1225
Texas M	lb.	.0740 -	.1225
Witco Disperso No. 1	lb.	.0740 -	.1225

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0740 -	.1225
Continental AA	lb.	.0740 -	.1225
Croflex 77	lb.	.0740 -	.1225
Dixiedensed 77	lb.	.0740 -	.1225
Kosmobile 77	lb.	.0740 -	.1225
Micronex W-6	lb.	.0740 -	.1225
Spheron 9	lb.	.0740 -	.1225
Texas E	lb.	.0740 -	.1225
Witco Disperso No. 12	lb.	.0740 -	.1225
Wyex	lb.	.0740 -	.1225

Channel, Conductive (CC) (bags)

Continental R-40	lb.	.1800 -	.2400
Dixie 5 Dustless	lb.	.0950 -	.1550
Dixie Voltex	lb.	.1950 -	.2500
Spheron I	lb.	.1200 -	.1650
Kosmink Dustless	lb.	.0950 -	.1550
Kosmos Voltex	lb.	.1950 -	.2500
Spheron C	lb.	.1400 -	.1850
Spheron N	lb.	.2500 -	.2900
Voltex	lb.	.1950 -	.2500

Conductive Furnace Black (CFB) (bags)

Aromex 115	lb.	.0890 -	.1290
Shawinigan Acetylene Black	lb.	.1600 -	.2200
Vulcan C	lb.	.1100 -	.1530

Furnace, Fast Extruding (FEF) (bags)

Arovel	lb.	.0600 -	.1000
Croflex 50	lb.	.0600 -	.1000
Dixie 50	lb.	.0600 -	.1000
Kosmos 50	lb.	.0600 -	.1000
Philblack A	lb.	.0600 -	.1000
Statex M	lb.	.0600 -	.1000
Sterling SO	lb.	.0600 -	.1000

Furnace, General Purpose (GPF) (bags)

Sterling V	lb.	.0500 -	.0900

Furnace, High Modulus (HMF) (bags)

Collocarb	lb.	.0550 -	.0950
Continex HMF	lb.	.0550 -	.0950
Croflex 40	lb.	.0550 -	.0950
Dixie 40	lb.	.0550 -	.0950
Kosmos 40	lb.	.0550 -	.0950
Modulex	lb.	.0550 -	.0950
Statex 93	lb.	.0550 -	.0950
930	lb.	.0470 -	.0870
Sterling L	lb.	.0550 -	.0950
LL	lb.	.0550 -	.0950

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0400 -	.0800
Croflex 20	lb.	.0400 -	.0800
Dixie 20	lb.	.0400 -	.0800
Essex	lb.	.0400 -	.0800
Furnex	lb.	.0400 -	.0800
Gastex	lb.	.0450 -	.0850
Kosmos 20	lb.	.0400 -	.0800
Pelletex	lb.	.0400 -	.0800
NS	lb.	.04 -	.08
Sterling NS	lb.	.0400 -	.0800
Sterling R	lb.	.0450 -	.0850
Sterling S	lb.	.0400 -	.0800

Furnace, Fine (FF) (bags)

Statex B	lb.	.0650 -	.1050
Sterling 99	lb.	.0650 -	.1050

Furnace, High Abrasion (HAF) (bags)

Aromex	lb.	.0790 -	.1250
115	lb.	.0890 -	.1290
Continex HAF	lb.	.0790 -	.1250
Croflex 60	lb.	.0790 -	.1175
Dixie 60	lb.	.0790 -	.1175
Kosmos 60	lb.	.0790 -	.1175
Philblack O	lb.	.0790 -	.1190
Statex R	lb.	.0790 -	.1250
Vulcan 3	lb.	.0790 -	.1220
6	lb.	.1100 -	.1530

Furnace, Super Abrasion (SAF) (bags)

Philblack E	lb.	.1350 -	.1750
Statex 125	lb.	.1100 -	.1550
9	lb.	.1350 -	.1780

Thermal, Fine (FT) bags)

P-33 (c.l.)	lb.	—— -	.0550

Thermal, Medium (MT) (bags)

Shellblack	lb.	—— -	.0250
Sterling MT (c.l.)	lb.	—— -	.0350
Thermax (c.l.)	lb.	—— -	.0350
Thermax, Stainless (c.l.)	lb.	—— -	.0450

REINFORCING AGENTS—SILICA

Hi-Sil	lb.	.10 -	.11½
C	lb.	.11 -	.12½
Santocel	lb.	.62 -	.64

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac	lb.	.30 -	.40
Darex Copolymer No. 3	lb.	.47 -	.49
X34	lb.	.42 -	.44
43G	lb.	.42 -	.44
Darex Copolymer Latex No. 3-L (and X34L)	lb.	.36½ -	.39
Durez 12687 (and 12707)	lb	—— -	.37
Durez 13355	lb.	—— -	.29½
Good-Rite Resin 50	lb.	.42 -	.44
Kralac A	lb.	.43 -	.44
Lampblack	lb.	—— -	.12
Marbon S and S-1	lb.	.42 -	.49
8000	lb.	.42 -	.49
Marmix	lb.	.42 -	.49
Pliolite Latex 190	lb.	.44 -	.45
Pliolite Resin-Rubber Master-batches	lb.	.45 -	.70
Pliolite NR	lb.	.99 -	1.00
Pliolite S3, S6, and S6B	lb.	.43 -	.44
Polyco 220	lb.	.22 -	.23
Zeolex 20	ton	120.00 -	140.00

RETARDERS

Dutch Boy Normasal	lb.	—— -	.46
ESEN	lb.	.35 -	.37
Harcopol 1183	lb.	.60 -	.66
Retarder ASA	lb.	—— -	.57
Retarder PD	lb.	.35 -	.37
Retarder T.C.M.	lb.	—— -	.65
Retarder W	lb.	—— -	.44½
Retardex	lb.	.47 -	.50

RUBBER SUBSTITUTES

Mineral Rubber

38	ton	38.00 -	40.00
Black Diamond	ton	38.00 -	40.00
Byerlyte	ton	47.00 -	54.00
Gilsonite, Selects (c.l.)	ton	37.00 -	38.00
Hard Hydrocarbon (dms.)	ton	46.50 -	48.50
Herron Flake	ton	—— -	45.00
Mineral Rubber, solid	ton	42.50 -	44.50
Pioneer	ton	35.00 -	46.00

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.29 -	.36
Brown	lb.	.1220 -	.2200
Dispersed	lb.	.26 -	.42
Neophax	lb.	.1570 -	.2680
White	lb.	.1480 -	.2560

Miscellaneous Rubber Substitutes

G.B. Asphaltenes	lb.	.06 -	.06½
Gilsowax B	lb.	.09 -	.11
Resin No. 1098 (drums)	lb.	—— -	.62
No. 1190	lb.	.46¾ -	.49¾

SOLVENTS

Acetone (dlvd.)	lb.	.08½ -	.11
American Dipentine	gal.	.44½ -	.68
American Pine Oil	gal.	.75½ -	.95½
Amsco Lactol Spirits (t.c.)	gal.	—— -	.18
Naphthol Spirits	gal.	—— -	.18
Mineral Spirits	gal.	—— -	.16
Rubber Solvent (t.c.)	gal.	—— -	.17
Solv A (t.c.)	gal.	—— -	.25½
Solv A-80 (t.c.)	gal.	—— -	.30½
Solv B (t.c.)	gal.	—— -	.29
Solv B-90 (t.c.)	gal.	—— -	.32
Solv D (t.c.)	gal.	—— -	.30½
Solv E	gal.	—— -	.29½
Solv F	gal.	—— -	.30½
Solv F-80	gal.	—— -	.34½
Special Naphtholite (t.c.)	gal.	—— -	.17
Special Textile Spirits	gal.	—— -	.18
Super Naphtholite	gal.	—— -	.17
Textile Spirits (t.c.)	gal.	—— -	.18
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	.09¼ -	.10¼
Benzol 90%	gal.	—— -	.48
Butyl Acetate (t.c.)	lb.	.13 -	.15½
Butyl Alcohol (t.c.)	lb.	.13 -	.15½
Secondary (dlvd.)	lb.	.11 -	.13½
Tertiary (dlvd.)	lb.	12 -	.14½
Carbon Bisulfide, Tech.	lb.	.0440 -	.0800
Carbon Tetrachloride	lb.	.08 -	.08½
Cosol 1	gal.	.37 -	.43
Cosol 2	gal.	.42 -	.48
Cyclohexane	gal.	.55 -	.72
Cyclohexanone	lb.	.25 -	.27
Diacetone, Pure (dlvd.)	lb.	.12 -	.14½
Dichlorethyl Ether (dms.)	lb.	.13 -	.15
Formal (dms.)	lb.	.29¾ -	.31¼
Dichloropentane (l.c.l.)	lb.	.05 -	.05¾
Dicom	gal.	.30 -	.42
Halowax Oil	lb.	.28 -	.41
Heptanes (t.c.)	gal.	.17 -	.22
Hexalin Cyclohexanol	lb.	.20 -	.22
Hexanes (t.c.)	gal.	.17 -	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.46 -	.63
Ether, Ref. (dlvd.)	gal.	.30 -	.47
Mersol	gal.	.43 -	.79
Mesityl Oxide (dlvd.)	lb.	.11½ -	.14
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.54½ -	.72¼
Methyl Ethyl Ketone	lb.	.11 -	.13½
Methyl Isobutyl Ketone (dlvd.)	lb.	.13 -	.15½
N-5 Pentane Mix. (t.c.)	gal.	—— -	.13½
N-6 Hexanes (t.c.)	gal.	—— -	.14½
N-7 Hexanes (t.c.)	gal.	—— -	.13½
Penetrell	gal.	.44½ -	.68
Petrolene (t.c.)	gal.	—— -	.13125
Picolines, Alpha, Refined	lb.	.44 -	1.00
Mixed	lb.	—— -	.34
Proprietary Solvent (dms.)	gal.	.51 -	.72
PT 150 Pine Solvent (dms.)	gal.	—— -	.44
Pyridine, Refined	lb.	—— -	1.15
Quinoline	lb.	.60 -	1.45
Rubber Solvent (t.c.)	gal.	—— -	.16
Rubsol (t.c.)	gal.	—— -	.11875
Skellysolve B (Hexanes) (t.c.)	gal.	—— -	.148
C (Heptanes) (t.c.)	gal.	—— -	.141
E (Octanes) (t.c.)	gal.	—— -	.155
R (Solvent Naphtha)	gal.	—— -	.114
Solvent, Crude, Light	gal.	.19 -	.28
Solvesso 100 (t.c.)	gal.	—— -	.28
150 (t.c.)	gal.	—— -	.28
Sunny South Dipentine	gal.	.44½ -	.68
Sunny South Pine Oil	gal.	.75½ -	.95½
Sunray	gal.	.1140 -	.1600
Toluene (drums)	gal.	—— -	.28
Toluol (t.c.)	gal.	—— -	.45
Trichlorethane	lb.	.11½ -	.13½
Triglycol Dichloride (dms.)	lb.	.63 -	.64
Union Thinner 1	gal.	—— -	1.78
3	gal.	—— -	1.78
5	gal.	—— -	1.68
7	gal.	—— -	1.68
2-50-W Hi-Flash	gal.	—— -	.41
X-7 Sp. Heptanes (t.c.)	gal.	—— -	.11
Xylol	gal.	—— -	.45

STABILIZING AGENTS (for Vinyl Resins)

Advastab No. 21	lb.	—— -	1.08
Basic Silicate White Lead	lb.	.17¼ -	.18¾
Bunatak Polymer No. 780	lb.	—— -	.04
No. 5514	lb.	—— -	.35
BVS	lb.	—— -	.73¾
Cadmium Stearate	lb.	1.42 -	1.44
Dutch Boy DS-207	lb.	—— -	.54
Plumb-O-Sil A	lb.	—— -	.29¾
B	lb.	—— -	.31¼
Tribase	lb.	—— -	.27¾
Dythal	lb.	—— -	.41
Ferro 120 (dms.)	lb.	.73¼ -	.75¼
121 (dms.)	lb.	.68 -	.70
200 (dms.)	lb.	1.33 -	1.35
211 (dms.)	lb.	.65 -	.67
221 (dms.)	lb.	1.51 -	1.53
541 (dms.)	lb.	.35½ -	.37½
541A (dms.)	lb.	.81¼ -	.83¾
620 (dms.)	lb.	.75½ -	.77½
700 (dms.)	lb.	.48¾ -	.50¾
900 (dms.)	lb.	1.02¾ -	1.04¾
903 (dms.)	lb.	.65 -	.67
909 (dms.)	lb.	1.02¾ -	1.04¾
920	lb.	—— -	.98
931 (dms.)	lb.	.75¼ -	.92
1820 (dms.)	lb.	.90 -	.92

"WINDSOR CLAY"

A superior quality *HARD* rubber makers' clay we are mining and refining near Aiken, South Carolina. Available in compressed 50-lb. papers, palletized if desired. Exhaustive tests show this clay to have

- **high tensile**
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- **ph - 5.1**
- **uniformly high color**

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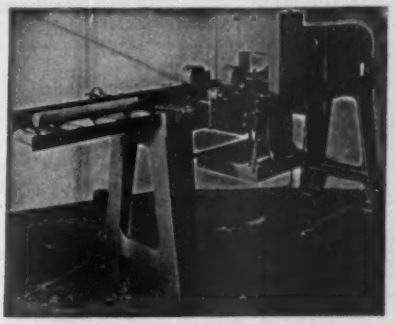

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STATEX 125

STABILIZING AGENTS (Cont'd)

Harshaw 1-V-3	lb.	.43	.58
1-V-4	lb.	.74	.89
2-V-4	lb.	1.19	1.29
2-V-7	lb.	1.24	1.34
2-V-8	lb.	1.34	1.49
5-V-1	lb.	.41	.56
5-V-2	lb.	.44	.59
7-V-1	lb.	.95	1.05
7-V-2	lb.	1.00	1.15
8-V-1	lb.	1.23	1.33
8-V-3	lb.	.60	.70
8-V-5	lb.	.93	1.03
9-V-1	lb.	.89	.99
9-V-2	lb.	.45	.60
12-V-5	lb.	.90	1.05
128-V-5	lb.	.86	1.01
Lead Stearate No. 102	lb.	.33	.34
Lead Stearate, Precip.	lb.	.39	.41
Fused	lb.	—	.35½
Lithium Stearate	lb.	.72	.88½
Stabelan E	lb.	1.39	1.50
XL	lb.	.60	.70
G	lb.	.85	.95
HR	lb.	1.25	1.40
Stabilizer No. 3	lb.	—	2.15
Stabilizer No. 21	lb.	—	1.08
Stabilizer No. 42	lb.	—	.85
Stabilizer No. 52	lb.	—	2.15
Stabilizer No. 89X	lb.	—	.75
Stabilizer No. 143	lb.	—	.85
Stabilizer BC-12	lb.	—	.90
Stabilizer B-5	lb.	—	.70
Stabilizer CH-14	lb.	—	.65
Stabilizer CH-20	lb.	—	.65
Stabilizer E6B	lb.	—	.93
Stabilizer E-49	lb.	—	.60
Stabilizer E-98	lb.	—	.55
Stabilizer G-1	lb.	1.25	1.40
Stabilizer HR	lb.	.85	.89
Stabilizer JCX	lb.	—	.63
Stabilizer L	lb.	—	.60
Stabilizer OM-10	lb.	—	2.15
Stabilizer OM-18	lb.	—	3.65
Stabilizer SN	lb.	—	.48
Stabilizer V-1-N	lb.	—	.43
Stabilizer VL-3	lb.	—	1.00
Stabilizer V-7939	lb.	—	.60
Staycin 1	lb.	—	.65
Vanstay L	lb.	.33	.35
H	lb.	.75	.77
H.T.	lb.	.90	.92
S	lb.	.65	.70

STIFFENING AGENTS

Calco S.A.	lb.	.85	.88

SUN CHECKING AGENTS

Antisol	lb.	—	.33
Antisun	lb.	—	.18½
Heliozone	lb.	.26	.27
NBC	lb.	—	1.55
Sharples Wax	lb.	.23	.24
Sunolite	lb.	.21	.23
Sunproof 713	lb.	.25	.26
Imp.	lb.	.33	.34
Jr.	lb.	.18	.19
Tonox	lb.	.51½	.53½

SURACE ACTIVE AGENTS

Aquarex D	lb.	—	.80
MDL	lb.	—	.33
ME	lb.	—	.97
NS	lb.	—	.60
SMO	lb.	—	.50
WAQ	lb.	—	.28

TACKIFIERS

Arcco 620-32B	lb.	.20	.21
716-30	lb.	.18	.19
1941-21	lb.	.16	.17
Galex (drums)	lb.	.15½	.19¼
Indopol H-300	gal.	1.00	1.21
Koresin	lb.	.73	.75
Liquid Rubber Flux	lb.	—	.14
Nilox (c.l.)	cwt.	—	14.50
Resin V	lb.	—	.23¼
Rubtack	lb.	—	.12
Synthol	lb.	—	.24¼
Vistac No. 1	gal.	1.00	1.21
A	lb.	.21½	.22¼
Zirex (c.l.)	cwt.	—	14.75

THICKENERS (FOR LATEX)

Alcogum AN-6	lb.	—	.85
AN-10	lb.	—	.08¼
Betanol (drums)	lb.	—	.70
Emcol PL50-3 (dms.)	lb.	—	.57
Emulsorex No. 5	lb.	—	.35
Good-Rite K-702	lb.	.34½	.35
K-704	lb.	.21	.22
K-705	lb.	.30	.31
K-707	lb.	.18	.19
K-708	lb.	.29	.30
K-710	lb.	.15¾	.16¼
Lecithin	lb.	.12	.17
Modicol VD	lb.	—	.12¼
VE	lb.	—	.10¼
VF	lb.	—	.10¾
VK	lb.	—	.07
Polyco 296	lb.	.15	.16
296-N	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.67
Sodium Silicate	cwt.	1.50	2.65

VULCANIZING AGENTS

Selenium

Vandex	lb.	—	3.50

Sulfur

Blackbird	cwt.	—	2.30
Crystex	lb.	.19½	.23
Darex Dispersed Sulfur	lb.	.12½	.17½
Devil (c.l.)	cwt.	—	1.75
Dispersed Sulfur	lb.	.12½	.14½
Insoluble Sulfur 60	lb.	.12½	.13
Spider	cwt.	—	2.30
Star (c.l.)	cwt.	—	2.25
Tire (c.l.)	cwt.	—	1.75
Tube	cwt.	—	2.25
Vultac 2	lb.	.47	.49
3	lb.	.51	.53

Tellurium

Telloy	lb.	—	2.50

WETTING AGENTS

Advawet No. 10	lb.	—	.20
No. 15	lb.	—	.21½
No. 33	lb.	—	.48
Aerosol 18	lb.	—	.40
AY	lb.	1.00	1.25
MA	lb.	1.00	1.25
OT 70% Clear	lb.	.80	1.00
OT 100%	lb.	1.00	1.50
Alrosol (dms.)	lb.	—	.40
Alrosperse	lb.	—	.18
Areskap 50	lb.	.30	.38
Dry 100	lb.	.60	.72
Aresket 240	lb.	.30	.38
Dry 300	lb.	.60	.72
Aresklene 375	lb.	.42	.57
Armacs	lb.	.29	.76
Arquads	lb.	.21	.61
Emcol 5100 (dms.)	lb.	—	.40
5130 (dms.)	lb.	—	.40
Etho-chemicals	lb.	.34	.80
Kessco E-122 (dms.)	lb.	—	.49
Kreelon 4G (bags)	lb.	.132	.155
8G (dms.)	lb.	28	.30
Lecithin	lb.	.13	.17
Modicol L	lb.	—	.58
N	lb.	—	.40
S	lb.	—	.32
Nekal NS	lb.	—	.28
Nopco 1086-A	lb.	.42	.50
1187-X	lb.	—	.14½
Parnol	lb.	.13	.18
Selapon Gel	lb.	—	.13
Santomerse D	lb.	.44	.65
S	lb.	.13	.25
Sorapon SB	lb.	.14	.15
SF Conc.	lb.	.29	.30
Sorbit P	lb.	—	.25
Stablex G	lb.	.50	.70
Tergitol 4 (dms., dlvd.)	lb.	.30	.31
7 (dms., dlvd.)	lb.	.36	.37
08 (dms., dlvd.)	lb.	.30	.31
P28 (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol	lb.	—	.17½
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D-Tac	lb.	—	.22
2-Ethylhexanol	lb.	.27¾	.29¾
Fura-Tone Resin 1226	lb.	.41	.43
MODX	lb.	.29½	.34
Para Resin 2457	lb.	.04	.04½
2702	lb.	.04	.04½
2718	lb.	.04	.04½
Pigmented Filmite (dlvd.)	lb.	—	.16¾
Resorcin, Tech.	lb.	.82½	.83½
Sherosope F	lb.	.17	.17½
F-445	lb.	.17	.17¼
L	lb.	.18	.18¼
N	lb.	.18	.18¼
T	lb.	.18	.18¼
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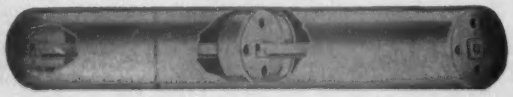

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STATEX 125

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INDEX TO ADVERTISERS

A

Accurate Steel Die Mfgrs. 9
Ace Machine and Mould Company, Inc. 135
Adamson United Co. ..... —
Adhesive Products Corp. 145
Aetna-Standard Engineering Co. 11
Airkem, Inc. 33
Akron Equipment Co. 135
Akron Prestorm Mold Co. 109
Akron Rubber Machinery Co. 145
Albert, L., & Son 145
Alco Oil & Chemical Corp. 127
Aluminum Flake Co. 139
American Cyanamid Co.
Calco Chemical Div. 41, 45
American Zinc Sales Co. ..... —
Argus Chemical Laboratory 120
Atlas Electric Devices Co. ..... —

B

Baird Rubber and Trading Co. 116
Baker Castor Oil Company 25
Barrett Div., Allied Chemical & Dye Corp. 44
Bestread Products Co. 144
Binney & Smith Co. ..... Insert Following 94
Black Rock Mfg. Co. 129
Bolling, Stewart, & Company, Inc. 8
Bonwit, Eric 144
Bridgwater Machine Co., The 27
Brockton Cutting & Die Machine Co. 123
Brooklyn Color Works, Inc. ..... —
Brown Company 40

C

Cabot, Godfrey L., Inc. 39, 123
Cambridge Instrument Co. ..... —
Carbon Black Packing Co. 119
Carey, Phillip, Mfg. Co. 139
Carter Bell Mfg. Co. 124
Chemicals-Pigments-Metals
Div. Glidden Co. ..... —
Chemical Publishing Co. ..... —
CLASSIFIED ADVERTISING 143, 144, 145, 146
Cleveland Liner & Mfg. Co. 14
Colledge, E. W., General Sales Agent, Inc. ..... —
Columbia-Southern Chemical Corp. 46
Columbian Carbon Co. ..... Insert Following 94
Concord Mica Corp. 141
CONSULTANTS SECTION 145
Continental Carbon Co. 28, 29
Coulter, James, Machine Co. ..... —
Cumberland Engineering Co., Inc. 121

D

Diamond Alkali Company
Pure Calcium Prod. Div. 22
Diamond Metal Prod. Co. ..... —
Dow Corning Corp. 12
E. F. Drew & Co., Inc. 21
du Pont de Nemours, E. I., & Co., Inc.
Rubber Chemicals Div. ..... Second Cover
Grasselli Chemicals Dept. 42, 43

E

Elm City Rubber Co. 144
Emery Industries, Inc. 115
English Mica Co. 145
Erie Foundry Company 13

F

Farrel-Birmingham Co., Inc. 23, 49
Ferry Machine Co. ..... —
Fidelity Machine Co., Inc. ..... —
Flexo Supply Co. 137
Foremost Machine Builders Inc. 121

G

Gammeter, W. F., Co. 135
Gelb, R., & Sons, Inc. 146
General Atlas Carbon Co. 51
General Electric Co. 50
General Latex & Chemical Corp. 119
Genseke Brothers ..... —
Gidley, Philip Tucker 145
Glidden Co., Chemicals, Pigments & Metals Division ..... —
Goodrich, B. F., Chemical Co. (Hycar) 3
Goodyear Tire & Rubber Co.
(Chemical Div.) 6, 7
Gummi und Asbest ..... —

H

Hadley Bros.-Uhl Co. 18
Hale & Kuligren, Inc. 145
Hall, C. P., Co. 26
Hardesty Chemical Co., Inc. ..... —
Hardman, H. V., Co., Inc. 129
Harwick Standard Chemical Co. ..... Back Cover
Hercules Powder Company, Inc. 24
Hevgatex Corporation ..... —
Hoggson & Pettis Mfg. Co. 139
Holliston Mills, Inc. ..... —
Holmes, Stanley H., Co. 122
Howe Machinery Co., Inc. 143
Huber, J. M., Corp. 40

I

Indoil Chemical Co. ..... —
Industrial Ovens, Inc. 143
Institution of the Rubber Industry ..... —
Interstate Welding Service 36

J

Johnson Steel & Wire Co., Inc. 38

K

K.B.C. Industries, Inc. 145
Kautschuk und Gummi ..... —
Koppers Co., Inc. 133

L

Lambert, E. P., Co. ..... —
Link Engineering Co. ..... —

M

Marbon Corp. 5
Marine Magnesium Products, Division of Merck & Co., Inc. 137
Maryland Cork Co. ..... —
Monsanto Chemical Co.
Organic Division 111
Mt. Vernon-Woodberry Mills, Inc. 59
Muehlstein, H., & Co., Inc. 107
Mumper, James F., Co. 145

N

National Chemical & Plastics Co. ..... —
National Rosin Oil Products, Inc. 137
National Rubber Machinery Co. 57
National Sherardizing Machine Co. 145
National-Standard Co. ..... —
Naugatuck Chemical Division
U. S. Rubber Co. 31, 62
Neville Co. 35
New England Engineering ..... —
New Jersey Zinc Co. 56

O

Oakite Products, Inc. 121
Olin, R. R., Laboratories 145
Oronite Chemical Company 34

P

Pan American—Chemicals Division 18
Pennsylvania Industrial Chemical Corp. 15
Pequanoc Rubber Co. 48
Phillips Chemical Co. 4
Pike, S. J., & Co., Inc. 131
Pittsburgh Coke & Chemical Co. ..... —
Preventive Maintenance Co. ..... —
Progressive Service Co. ..... —

R

Rand Rubber Co., Inc. ..... —
Randall, Frank E., Co. ..... —
Rare Metal Products Co. 133
Revue Generale du Caoutchouc ..... —
Richardson, Sid, Carbon Co. 152
Rotex Rubber Company Inc. ..... —
Royle, John, & Sons 126
Rubber & Asbestos Corp. 142
Rubber Corp. of America, Latex Div. 139

S

St. Joseph Lead Co. ..... —
Saniseal Mfg. Co. ..... —
Schulman, A., Inc. ..... Inside Back Cover
Scott Testers, Inc. 117
Sharples Chemicals Inc. ..... Insert following page 36
Shaw, Francis & Co., Ltd. 113
Shell Chemical Corp. ..... —
G. Siempelkamp & Co. 123
Simplex Cloth Cutting Machine Co., Inc. 139
Sindar Corporation 133
Sivon Machine & Engineering Co. ..... —
Skelly Oil Co., Solvents Div. 32
Snell, Foster D., Inc. 127
Sorvall, Ivan, Inc. ..... —
South Florida Test Service 145
Southeastern Clay Co. 135
Southern Clays, Inc. ..... —
Spadone Machine Co. 137
Stamford Rubber Supply Co. 38
Standard Machinery Co. 47
Stanley Electric Tool Div. ..... —
Stauffer Chemical Co. 17
Stoner's Ink Co. 151
Sun Oil Co. 16

T

Tanney-Costello Inc. 128
Tapper, Wm. 145
Taylor Instrument Companies ..... —
Taylor-Stiles and Co. 119
Testworth Laboratories, Inc. 127
Thiokol, Inc. 58
Thomaston Mills 129
Titanium Pigment Corp. 10
Tracerlab, Inc. ..... —
Trade News Service ..... —
Tumpeer Chemical Co. ..... —
Turner Halsey Co. 59

U

United Carbon Co. ..... Insert Following 18
United Clay Mines Corp. 141
United Engineering & Foundry Co. ..... —
United Rubber Machinery Exchange ..... —
U. S. Rubber Reclaiming Co. ..... —
Utility Mfg. Co. 141

V

Vanderbilt, R. T., Co. ..... Front Cover
Velsicol Corp. 52

W

Wellington Sears Co. 30
Western Supplies Co. 125
White, J. J., Products Co., Inc. ..... —
Whittaker, Clark & Daniels, Inc. 137
Williams, C. K., & Co. 118
Wilson, Charles T., Co., Inc. 133
Witco Chemical Co. 28, 29
Woloch, George Co. ..... —
Wood, R. D., Co. 53

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INDEX TO ADVERTISERS

A

Accurate Steel Die Mfgrs. 9
Ace Machine and Mould Company, Inc. 135
Adamson United Co. ..... —
Adhesive Products Corp. 145
Aetna-Standard Engineering Co. 11
Airkem, Inc. 33
Akron Equipment Co. 135
Akron Presform Mold Co. 109
Akron Rubber Machinery Co. 145
Albert, L., & Son 145
Alco Oil & Chemical Corp. 127
Aluminum Flake Co. 139
American Cyanamid Co.
Calco Chemical Div. 41, 45
American Zinc Sales Co. ..... —
Argus Chemical Laboratory 120
Atlas Electric Devices Co. ..... —

B

Baird Rubber and Trading Co. 116
Baker Castor Oil Company 25
Barrett Div., Allied Chemical & Dye Corp. 44
Bestread Products Co. 144
Binney & Smith Co. ..... Insert Following 94
Black Rock Mfg. Co. 129
Bolling, Stewart, & Company, Inc. 8
Bonwit, Eric 144
Bridgwater Machine Co., The 27
Brockton Cutting & Die Machine Co. 123
Brooklyn Color Works, Inc. ..... —
Brown Company 40

C

Cabot, Godfrey L., Inc. 39, 123
Cambridge Instrument Co. ..... —
Carbon Black Packing Co. 119
Carey, Phillip, Mfg. Co. 139
Carter Bell Mfg. Co. 124
Chemicals-Pigments-Metals
Div. Glidden Co. ..... —
Chemical Publishing Co. ..... —
CLASSIFIED ADVERTISING 143, 144, 145, 146
Cleveland Liner & Mfg. Co. 14
Colledge, E. W., General Sales Agent, Inc. ..... —
Columbia-Southern Chemical Corp. 46
Columbian Carbon Co. ..... Insert Following 94
Concord Mica Corp. 141
CONSULTANTS SECTION 145
Continental Carbon Co. 28, 29
Coulter, James, Machine Co. ..... —
Cumberland Engineering Co., Inc. 121

D

Diamond Alkali Company
Pure Calcium Prod. Div. 22
Diamond Metal Prod. Co. ..... —
Dow Corning Corp. 12
E. F. Drew & Co., Inc. 21
du Pont de Nemours, E. I., & Co., Inc.
Rubber Chemicals Div. ..... Second Cover
Grasselli Chemicals Dept. 42, 43

E

Elm City Rubber Co. 144
Emery Industries, Inc. 115
English Mica Co. 145
Erie Foundry Company 13

F

Farrel-Birmingham Co., Inc. 23, 49
Ferry Machine Co. ..... —
Fidelity Machine Co., Inc. ..... —
Flexo Supply Co. 137
Foremost Machine Builders Inc. 121

G

Gammeter, W. F., Co. 135
Gelb, R., & Sons, Inc. 146
General Atlas Carbon Co. 51
General Electric Co. 50
General Latex & Chemical Corp. 119
Genseke Brothers ..... —
Gidley, Philip Tucker 145
Glidden Co., Chemicals, Pigments & Metals Division ..... —
Goodrich, B. F., Chemical Co. (Hycar) 3
Goodyear Tire & Rubber Co.
(Chemical Div.) 6, 7
Gummi und Asbest ..... —

H

Hadley Bros.-Uhl Co. 18
Hale & Kullgren, Inc. 145
Hall, C. P., Co. 26
Hardesty Chemical Co., Inc. ..... —
Hardman, H. V., Co., Inc. 129
Harwick Standard Chemical Co. ..... Back Cover
Hercules Powder Company, Inc. 34
Hevegatex Corporation ..... —
Hoggson & Pettis Mfg. Co. 139
Holliston Mills, Inc. ..... —
Holmes, Stanley H., Co. 122
Howe Machinery Co., Inc. 141
Huber, J. M., Corp. 60

I

Indoil Chemical Co. ..... —
Industrial Ovens, Inc. 143
Institution of the Rubber Industry ..... —
Interstate Welding Service 36

J

Johnson Steel & Wire Co., Inc. 38

K

K.B.C. Industries, Inc. 145
Kautschuk und Gummi ..... —
Koppers Co., Inc. 133

L

Lambert, E. P., Co. ..... —
Link Engineering Co. ..... —

M

Marbon Corp. 5
Marine Magnesium Products, Division of Merck & Co., Inc. 137
Maryland Cork Co. ..... —
Monsanto Chemical Co.
Organic Division 111
Mt. Vernon-Woodberry Mills, Inc. 59
Muehlstein, H., & Co., Inc. 107
Mumper, James F., Co. 145

N

National Chemical & Plastics Co. ..... —
National Rosin Oil Products, Inc. 137
National Rubber Machinery Co. 57
National Sherardizing Machine Co. 145
National-Standard Co. ..... —
Naugatuck Chemical Division
U. S. Rubber Co. 31, 62
Neville Co. 35
New England Engineering ..... —
New Jersey Zinc Co. 56

O

Oakite Products, Inc. 121
Olin, R. R., Laboratories 145
Oronite Chemical Company 34

P

Pan American—Chemicals Division 18
Pennsylvania Industrial Chemical Corp. 15
Pequanoc Rubber Co. 48
Phillips Chemical Co. 4
Pike, S. J., & Co., Inc. 131
Pittsburgh Coke & Chemical Co. ..... —
Preventive Maintenance Co. ..... —
Progressive Service Co. ..... —

R

Rand Rubber Co., Inc. ..... —
Randall, Frank E., Co. ..... —
Rare Metal Products Co. 133
Revue Generale du Caoutchouc ..... —
Richardson, Sid, Carbon Co. 152
Rotex Rubber Company Inc. ..... —
Royle, John, & Sons 126
Rubber & Asbestos Corp. 142
Rubber Corp. of America, Latex Div. 139

S

St. Joseph Lead Co. ..... —
Saniseal Mfg. Co. ..... —
Schulman, A., Inc. ..... Inside Back Cover
Scott Testers, Inc. 117
Sharples Chemicals Inc. ..... Insert following page 36
Shaw, Francis & Co., Ltd. 113
Shell Chemical Corp. ..... —
G. Siempelkamp & Co. 123
Simplex Cloth Cutting Machine Co., Inc. 139
Sindar Corporation 133
Sivon Machine & Engineering Co. ..... —
Skelly Oil Co., Solvents Div. 32
Snell, Foster D., Inc. 127
Sorvall, Ivan, Inc. ..... —
South Florida Test Service 145
Southeastern Clay Co. 135
Southern Clays, Inc. ..... —
Spadone Machine Co. 137
Stamford Rubber Supply Co. 38
Standard Machinery Co. 47
Stanley Electric Tool Div. ..... —
Stauffer Chemical Co. 17
Stoner's Ink Co. 151
Sun Oil Co. 16

T

Tanney-Costello Inc. 128
Tapper, Wm. 145
Taylor Instrument Companies ..... —
Taylor-Stiles and Co. 119
Testworth Laboratories, Inc. 127
Thiokol, Inc. 58
Thomaston Mills 129
Titanium Pigment Corp. 10
Tracerlab, Inc. ..... —
Trade News Service ..... —
Tumpeer Chemical Co. ..... —
Turner Halsey Co. 59

U

United Carbon Co. ..... Insert Following 18
United Clay Mines Corp. 141
United Engineering & Foundry Co. ..... —
United Rubber Machinery Exchange ..... —
U. S. Rubber Reclaiming Co. ..... —
Utility Mfg. Co. 141

V

Vanderbilt, R. T., Co. ..... Front Cover
Velsicol Corp. 52

W

Wellington Sears Co. 30
Western Supplies Co. 125
White, J. J., Products Co., Inc. ..... —
Whittaker, Clark & Daniels, Inc. 137
Williams, C. K., & Co. 118
Wilson, Charles T., Co., Inc. 133
Witco Chemical Co. 28, 29
Woloch, George Co. ..... —
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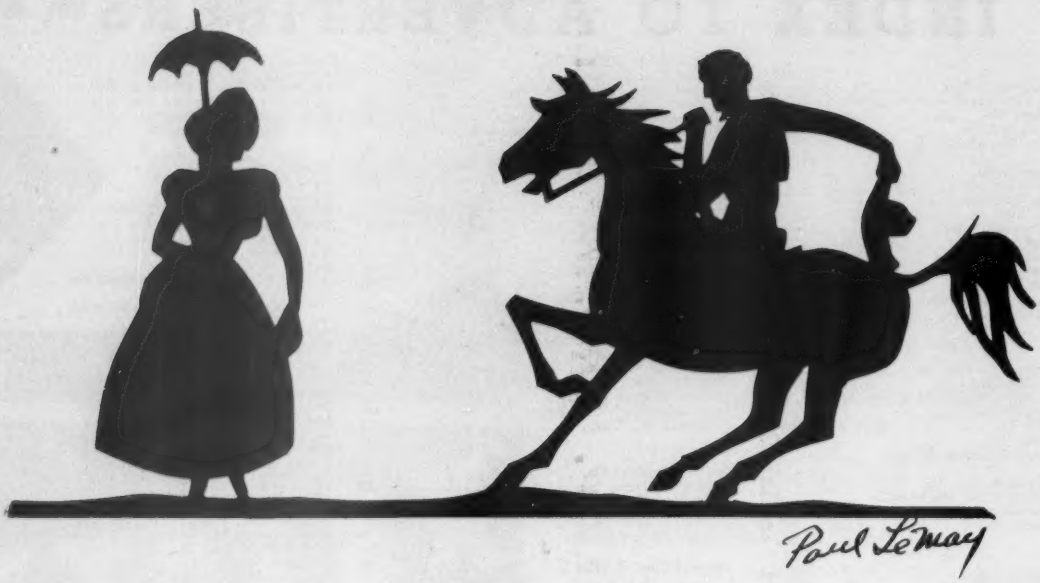

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